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15 March 1977

USSR

EAST EUROPE

USSR AND EASTERN EUROPE SCIENTIFIC ABSTRACTS

ELECTRONICS AND ELECTRICAL ENGINEERING

No. 28

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No. 28

This serial publication contains abstracts of articles and news items from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

CONTENTS PAGE

HUNGARY UDC 621.375.028.3

LOW-NOISE BIOLOGICAL AMPLIFIER WITH HIGH INPUT IMPEDANCE

Budapest MERES ES AUTOMATIKA in Hungarian Vol 24 No 12, 1976 pp 474-478 manuscript received 21 May 76

BORSANYI, GYORGY, Institute of Communications Electronics, BME [Budapest Technical University]

[Abstract] The amplifier developed for the amplification of weak electrical signals obtained in biological tests (such as the intracellular study of nerve-cell activities with microelectrodes) has low noise and high input impedance; it is described and illustrated with circuit diagrams. It employs low-control electrode current (less than 1 pA) barrier-layer space-controlled transistor types, which have a temperature-independent working point. Suppression of interfering signals is accomplished through the cable connecting the test probe and the main amplifier. The field-effect transistor temperature-dependence, noises in the no-barrier region, and in the barrier region, which determine overall performance, were described. The transistor used in the device is the F1 Siliconix U 273; Type n channel field-effect transistor. Its working-point data are: U_p = 1.1 V; I_{DSS} = 1.2 mA; U_{DS} = 0.5; I_{Dopt} = 315 µA: U_{Gsopt} = 0.514 V; S = 0.85 mS; µ = 10. The upper limit frequency is 3 kHz without regeneration with a 10 MΩ generator resistance; 30 kHz with an approximately 10-fold loop-amplification feedback. The device uses a Fairchild 715 operational amplifier. Figures 4; references 4: 1 Hungarian and 3 Western.

USSR

UDC 621.396.67.001.5

ON THE PROBLEM OF SYNTHESIS OF ARBITRARY ANTENNA ARRAYS WITH RANDOM CURRENT EXCITATION

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2411-2415 received 1 Jun 73; after revision 18 Feb 76

KORNIYENKO, L. G.

[Abstract] During synthesis of antennas with an optimum radiation pattern it is important to find a generalized criterion of optimumness which would make it possible from common positions to investigate different forms of the problem of optimization and to develop a common mathematical apparatus for their solution. The present brief communication considers this problem of synthesis and a method for its solution. The block diagram of an algorithm for the solution of part of the problem is shown, the results are tabulated of calculations of an optimum array in the absence of error, and graphs are presented of a number of optimum radiation patterns. The author thanks Ya. S. Shifrin for valuable council during discussion of the work. Figures 2; tables 1; references 7: 3 Russian, 4 Western.

USSR

UDC 621.396.67.091

MAXIMATION OF THE GAIN OF ANTENNA ARRAYS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2284-2291 manuscript received 11 Apr 75

MARTYNOV, M. A., PAVLYUK, V. A., and RYBALKO, A. M.

[Abstract] The problem is poised and solved of maximizing the gain of discrete antenna arrays with limitation of the Q-factor and the presence of random errors in the amplitudes and phases of the exciting currents and of the position of the radiators. Using as an example a linear equidistant array of axial radiation, consisting of electrical or magnetic dipoles, the results of numerical calculation indicate that the use of superconducting radiators opens the possibility of creating highly effective small-sized discrete antennas of moderate superdirectivity. The authors thank Ye. F. Krivosheyev for helpful discussions and for participation in consideration of the results. Figures 5; references 8: 5 Russian, 1 Hungarian, 2 Western.

USSR

SPECIAL FEATURES OF CHOICE OF ANTENNAS FOR INTRAOBLAST SHORT-WAVE RADIO COMMUNICATION

Moscow VESTNIK SVYAZI in Russian No 11, No 76, pp 23-25

AKSYUTIN, A. D., and PETUNIN, L. N., leading engineers of NIIR [? Radio Scientific-Research Institute]

[Abstract] The introduction of single-band short-wave (SW) radio stations facilitates an increase of the rate of growth of the number of circuits and networks for SW radio communication. However, mutual interference is increased by this, which is particularly objectionable on intraoblast radio communication circuits where transmissions of comparatively low power are used. The essential condition for increasing the quality and reliability of radio communication turns into a decrease of the mutual interference between circuits and networks by means of an efficient and economical use of the frequency spectrum of the SW band, which can partially be attained by a correct choice of antennas. The paper presents the characteristics of various types of antennas and makes recommendations with respect to the choice of antennas for interoblast and local SW radio communication circuits, as well as to the development of new types of antenna designs. Figure 1.

USSR

APPLICATION OF INDICATOR FOR MATCHING OF HIGH-FREQUENCY LINES DURING PREVENTIVE MAINTENANCE OF ANTENNA-FEEDER STRUCTURES

Moscow VESTNIK SVYAZI in Russian No 11, Nov 76 pp 19-21

SUPAKOV, N. A., engineer of receiving radio center SUR-1

[Abstract] An increase of the quality of maintenance of the antenna-feeder systems of receiving radio centers promotes the use of perfected control-and-measuring equipment which makes it possible more rapidly and with smaller labor costs to detect and remove defects of the elements of these systems and to assure their reliable and high-grade operation. The present paper discusses a test of the use of an oscillographic indicator for matching of the feeder lines of receiving radio centers. A pulse method is used during checking of antenna-feeder structures with the aid of the indicator. Use of the indicator makes it possible to increase the quality of preventive maintenance, and to reduce by four times the number of bypasses of antenna-feeder structures and to accelerate elimination of various faults. Figures 3.

USSR UDC 621.379:621.083.94

AUTOMATIC CHECKOUT OF WORKING CAPACITY AND DETERMINATION OF MALFUNCTION OF TELEVISION TRANSMITTING STATIONS

Moscow ELEKTROSVYAZ' in Russian No 11, 76 pp 43-48 manuscript received 30 Sep 75

KAZANOV, A. SH., MINDLIN, I. G., SHAFRAN, M. A., and NUDEL'MAN, I. I.

[Abstract] The paper considers the principles of construction of a system and apparatus for automatic checkout of the working capacity and determination of malfunctions of television transmitting stations (TTS) in the process of transmission. The results are presented of test operation at active stations of the apparatus described. Introduction of the apparatus in question at TTS makes it possible to accomplish automatically in the transmission process: checkout of the magnitude and tolerance checkout of TTS parameters; determination of malfunctions in TTS channels and connection of reserves; producing commands for correction of the respective parameters of a TTS; remote checkout of the working capacity and operational adjustment of the rated values of the TTS parameters. All this assures an increase of the stability of the TTS parameters, a reduction of the time of technical shutdowns and the time expended on finding malfunctions of the individual devices and on adjustment of the TTS, and the number of maintenance personnel of the TTS, which makes it possible to realize a considerable increase of the quality of television broadcasting and the efficiency of operation of the equipment of the TTS. The methods and apparatus considered find use during the creation of automated multiprogram TTS and networks and automatic television relay stations. Operation of the apparatus at active TTS makes it possible to accumulate data concerning the efficiency of the proposed method of detection of malfunctions of TTS and to determine the optimum tolerance on the parameters being checked. Figures 1; tables 2; references 9 (Russian).

USSR UDC 621.391.82:621.396.6

METHOD OF APPROXIMATE EVALUATION OF ELECTROMAGNETIC COMPATABILITY OF A COMPLEX OF RADIO FACILITIES

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 15-20 manuscript received after completion 16 Jan 75

VOLOSHIN, V. I.

[Abstract] Problems of a quantitative evaluation of the electromagnetic compatability (EMC) of a complex of radio facilities (RF) which consists of an arbitrary number of identical RF have previously been considered in the literature. The present paper approximately evaluates the EMC of a complex

which consists of an arbitrary number of RF for the general case of unlike RF. It is considered that all the RF of a complex operate in different radio networks or radio directions. The coefficient of electromagnetic compatability is equal to the ratio of the number of compatible frequency combinations of RF to the overall number of combinations. During the analysis, intermodulation interferences are not taken into account. In connection with this, during evaluation of the EMC of complexes in which simultaneous transmission of several RF is possible, the ratios obtained give excessive values of the characteristics of the EMS (maximum evaluation). Figures 5; tables 2; references 2 (Russian).

USSR UDC 621.391.272.037.37:621.317.35

CONCERNING ONE METHOD OF SEARCH FOR EXTREMUMS OF A SIGNAL IN NOISE

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 41-44 manuscript received 4 May 75

FOGEL'SON, YU. B., Moscow

[Abstract] The paper considers an iteration algorithm for use in searching for the extremums of a signal in the presence of noise. If the limitations inherent in the algorithm are taken into consideration it is possible to solve many problems of search for the peaks of a signal in noise, when the spectra of the signal and noise intersect with respect to frequency and the nonlinear limitations on the peaks of the signal are known. As an example, a figure is presented on which iteration steps are shown, made in a program putting this algorithm into practice during a search for "teeth" on an electrocardiogram. The author thanks Professor A. P. Manovtsev for his attention and support during fulfillment of this work. Figures 3; references 1 (Russian).

USSR UDC 621.395.74

OPTIMUM SYNTHESIS OF DIGITAL INTEREXCHANGE NETWORK OF RURAL TELEPHONE COMMUNICATION

Moscow ELEKTROSVYAZ' in Russian No 11, 76 pp 23-30 manuscript received 5 Apr 76

NIKIFOROV, N. P., and SVETLITSKIY, A. M.

[Abstract] The paper describes the use of digital transmission systems with pulse-code modulation (IKM). The developed complexes of apparatus IKM-12 x 3 ("Zona") and IKM-Microwave "Radan" and "Radas," which at present are being incorporated into rural telephone communication (STS) make available the possibility of organizing digital non-switched transit for groups of connecting lines, formed by subprimary or primary digital transmission systems. Subsequent modification of the complex of digital transmission systems mentioned as well as the creation of supply-line units for STS make it possible to assure durable digital transit both for groups of connecting lines and individual connection lines, which still further increases the economy and efficiency of a digital interexchange network. The special features of construction of a digital interexchange network for STS with use of an IKM system of multiplexing and a generalized statement of the problem of the optimum synthesis of a digital interexchange network are presented. A generalized algorithm for solution of the problem set, with account taken of the topological peculiarities of real networks, and the necessity for assuring a specified level of reliability are cited. Figures 5; tables 1; references 8 (Russian).

USSR UDC 621.395.74

INCREASE OF BALANCE ATTENUATION OF SUBSCRIBER NETWORKS

Moscow ELEKTROSVYAZ' in Russian No 11, 76 pp 30-34 manuscript received 2 Apr 74

SADOVSKIY, A. S., PAVLOVA, L. I., and VEMYAN, G. V.

[Abstract] The principal results are presented of an investigation of the balance attenuation of a differential system in versions of subscriber telephone channels widespread in the USSR, and possible methods of increasing the stability of communication are analyzed. The methods of measurement used and the processing of the results of the measurements are described in detail with graphs and tables. Figures 10; tables 3; references 4 (Russian).

USSR

UDC 621.395.344

INCREASE IN RELIABILITY OF CONTROL DEVICES OF QUASI-ELECTRONIC AUTOMATIC TELEPHONE EXCHANGE

Moscow ELEKTROSVYAZ' in Russian No 11, 76 pp 57-60 manuscript received 7 Jan 75

SOLOVOY, YU. V.

[Abstract] The paper considers pressing problems of developing efficient methods of increasing the reliability of the control devices of quasi-electronic automatic telephone exchanges without a significant increase of their size. The structure is considered of peripheral and central control devices with a build-in program which assures an increase of the reliability of their operation with a minimum increase of cost. In the case of a peripheral control devices it is advisable to use a sectional method of construction, in which the probability of reliable operation of the automatic telephone exchange increases and the size of the equipment does not increase. On the whole, in comparison with peripheral control devices, unit-type redundancy of central control devices gives a greater increase of average time of reliable operation of the central control devices with identical size of the equipment. Figures 2; references 2 (Russian).

USSR

HIGHER RATE OF TECHNICAL PROGRESS AT LONG-DISTANCE TELEPHONE OFFICES

Moscow VESTNIK SVYAZI in Russian No 11, Nov 76 pp 14-17

GERCHIKOV, YE. YA., chief of GUMTTS [expansion unknown] of the Ministry of Communications, UkrSSR

[Abstract] The paper considers some problems with respect to an increase of efficiency and the quality of work on automation of long-distance telephone communication on the territory of the Ukrainian SSR. Graphs of the following are presented: 1) Dynamics of growth and automation of terminal telephone channels; 2) Growth and change of structure of the extent of intraoblast telephone channels; 3)a. Percentage of Rayon centers, communication with which is organized by cable and radio relay lines; b. Growth of average number of telephone channels at one Rayon center; and 4) Dynamics of growth and automation of outgoing traffic at the Zhitomirskiy Long-Distance Telephone Office. Figures 4.

USSR

COURSE OF DEVELOPMENT OF MUNICIPAL TELEPHONE COMMUNICATION IN THE 10th FIVE-YEAR PLAN

Moscow VESTNIK SVYAZI in Russian No 11, Nov 76 pp 2-4

DOROZHKO, P. P., deputy chief, Main Administration of Municipal and Rural Telephony of the Ministry of Communications, USSR

[Abstract] The course of development of municipal telephone communication in the 10th Five-Year Plan is discussed in broad terms. For the purpose of a considerable improvement of serving of the population by the facilities of telephone communication, in August 1976 the Central Committee of the Communist Party of the Soviet Union considered the problem "Concerning measures with respect to acceleration of the growth of the country's telephone communication," and adopted proposals developed by Gosplan, USSR, and the Ministry of Communications, USSR. The Council of Ministers of the USSR adopted a decree in which the principal directions of the work of branches are determined. In the 10th Five-Year Plan it foresaw the construction and introduction into operation in municipalities, rayon centers, and workers' settlements of automatic telephone exchanges (ATE) with an overall capacity of 6 million numbers, which exceeds by 1.5 times the plan of the 9th Five-Year Plan. The Ministry for Production of Communication Means was given the task of manufacturing switching equipment for municipal ATE as well as the multiplex equipment of Type KAMA, IKM-30 and IKM-120 cable lines. The Ministry of Electrical Engineering Production is to increase the volume of production at operative enterprises of telephone cables and during 1977-1980 to work on reconstruction and technical re-equipment of a number of workshops and plants producing communication cables. Among various items discussed, means are outlined for careful expenditure of telephone cables by the Ministries of Communications of the Union Republics and other units. In the course of the Five-Year Plan multiplex equipment for a system of pulse-code modulation will be widely introduced, the use of which will considerably reduce the expenditure of telephone cable for trunk lines to ATE. The most serious attention will be given to an investigation of all possible means of reducing the cost of construction.

USSR

RURAL RADIO COMMUNICATION: ITS NEEDS AND RESPONSIBILITIES

Moscow RADIO in Russian No 11, 76 pp 4-5, 8

VEBER, YU.

[Abstract] At present more than 150 thousand radio stations for industrial radio communication in agriculture are in operation. These include short-wave and ultrashort wave radio stations of previous production and radio stations being produced at present. The bulk of these stations are concentrated in inter-industrial radio networks, kolkhoz, sovkhoz, and other agricultural enterprises directly producing an output. Interrayon and inter-oblast dispatcher radio networks are also evolving. This work is now increasing in connection with the acceptance by the Central Committee of the CPSU of a decree concerning a farther growth of specialization and concentration of agriculture production, and the creation of inter-economic associations. Basic data on and the particular uses of a number of radio station types now in operation or under development are discussed. Figures 1; tables 1.

USSR

LAYING AND INSTALLATION OF CABLES ON RURAL RADIOFICATION LINES

Moscow VESTNIK SVYAZI in Russian No 11, Nov 76 pp 17-19

PARFENOV, YU. A., candidate of technical sciences, and NAZAR'YEV, O. V., engineer: LONIIS [Leningrad Branch of the Scientific-Research Institute of Communications]

[Abstract] Development of a radiofication network in rural localities dictates the necessity for yearly construction of a large number of underground lines of single-pair cables. At present the length of radiofication cable lines amounts to approximately 1 million kilometers. The present paper cites the constructional and electrical characteristics of single-pair cables, and considers the principles of their laying and installation and the norms on the finished lines. Figures 3; tables 5.

USSR

ANALYSIS OF RELIABILITY OF METHODS OF MEASURING THE QUALITATIVE INDICES OF BROADCASTING TRANSMITTERS

Moscow VESTNIK SVYAZI in Russian No 11, Nov 76 pp 21-23

MOLDAVSKIY, L. M., chief of a laboratory, Georgian Republic Radio Center

[Abstract] The paper evaluates the degree of reliability of methods of measuring the power, nonlinear distortions and nonuniformities of the amplitude-frequency characteristics of AM broadcasting transmitters during starting and tune-up operations, preventive maintenance inspections and monitoring during transmission. Recommendations are presented which make it possible to increase the precision of measurement of the parameters enumerated. Figures 2.

EAST GERMANY

INSTRUMENT GROUP 19. S-3290.000 TEST-DATA PRINTING SYSTEM FROM THE RADIO WORKS COMBINE STATE ENTERPRISE IN ERFURT

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 21, Nov 76
pp 695-696

BARTUSCH, JUERGEN, and BERGER, ERHARD, graduate engineers

[Abstract] The 3rd-generation test-data printing system handles information signals (BCD 8-4-2-1 code), control signals (instruction and report signals), and command signals (red print, carriage return). It is suitable for the recording of test and numerical values on sheets and rolls of paper if the values are offered in binarily coded form as information signals according to standard interface 1.2. The units available include the converter, journal printer, and housing. The uses are for scientific instruments, medical laboratories, and the like. Recording is practically error-free; the print is clearly legible, the system is suitable for fully automated test stations, and operation is inexpensive. The design, construction, operation, performance, and application of the system is described and illustrated with block diagram and specification charts. Figures 2; tables 2; no references.

USSR

TOOL FOR ACQUISITION OF KNOWLEDGE OF THE EARTH AND UNIVERSE

Moscow RADIO in Russian No 11, 76 pp 14-16

TROITSKIY, V., corresponding member of the Academy of Sciences USSR, and ALEKSEYEV, V., candidate of physicomathematical sciences

[Abstract] This is the second of two articles (see RADIO, No 10, Oct 76, pp 14-16) explaining the principles of long-base interferometry. A radiointerferometer with a super-long base and systems of individual reception are discussed. A block diagram of the radio-interferometer is presented. Figures 1.

USSR

UDC 621.371

ON THE THEORY OF TRANSMISSION OF ELECTROMAGNETIC WAVES THROUGH DIELECTRIC LAYERS (II-EXPERIMENTAL PART)

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2401-2405 manuscript received 8 Aug 75

DEM'YANOV, V. V.

[Abstract] The results are presented of measurements of the complex transmission coefficient of dielectric layers, made at a wavelength λ_0 = 3 cm. The plates measured were of an identical thickness h = 0.41 cm, of Plexiglas ε_2^{II} = 2.5 and ceramic ε_2^{I} = 6.5. The error of measurements of the phase differences was 1° and the magnitude of θ, h_1, λ_0, 1 percent. Graphs are shown of the dependence of the advance of phase on the angle of incidence $\delta(\theta)$ for two plates. A block diagram of a device for measuring the phase characteristics of dielectric layers in free space, and the scheme of transmission of an electromagnetic beam through a dielectric plate are presented. Figures 4; references 11: 7 Russian, 4 Western.

USSR

UDC 621.371.34

CONCERNING THE RATE OF CHANGE OF THE PHASE OF A SIGNAL IN A TWO-BEAM SHORTWAVE CHANNEL

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 34-37 manuscript received 2 Jun 75

ANDRUSEVICH, L. K., SHEYNMAN, D. I., and SHLYAKHOV, I. M.

[Abstract] The paper obtains the distribution of the probabilities of the rate of change of the phase of a shortwave signal with two-beam propagation of the radio waves. In the case considered the fields of the individual beams are distributed according to the Rayleigh law. It is found that the rate of change of the phase increases with the appearance of a second beam which has a Doppler shift of the frequency with respect to the first. Relations are obtained for evaluation of the rate of change of the signal phase as a function of the Doppler shift of the frequency and as a function of the ratio of the powers in the individual beams. It is possible to employ the results of the analysis during evaluation of the noise immunity of shortwave communications lines with relative phase telegraphy. Figures 2; references 3: 2 Russian, 1 Western.

USSR UDC 621.371.332.4

BACK SCATTERING OF RADIO WAVES OF SHORT-WAVE BAND FROM SEA SURFACE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2300-2308 manuscript received 28 Aug 75

GARNAKER'YAN, A. A., and SOSUNOV, A. S.

[Abstract] The coherent and noncoherent components are important characteristics of a radio signal reflected from a statistically uneven surface. Using Kirchhoff approximations, the problem is considered of coherent and noncoherent scattering of radio waves from the sea surface, with quasi-harmonic correlation functions, taking account of the width of the radiation pattern of a receiving-transmitting antenna, and the angle of view, and the results obtained are compared with experiments. It is shown that the ratio of the power of the noncoherent component to the coherent with vertical irradiation of the surface and a wide radiation pattern of the antenna depends only on the height of the ordinates of the sea waves and the length of the radio waves which are radiated, and does not depend on the height of the receiver-transmitter location and its energy characteristics. An expression is obtained for the coefficient of variation of the envelope of the reflected signal and its connection established with the height of the sea waves. The results are presented of summer experimental investigations. These investigations were made in 1971-1974 from an aircraft 15-20 km from the shore of the Black Sea where the sea depth was 150-200 m, with the aid of a developed radar device of the short-wave radio band, operating in a pulsed regime. The length of the radiated waves was λ_1 = 10 m and λ_2 = 30 m; the radiated power in a pulse P_R = 100 W; the duration of the sound pulse τ_1 = 1 microsec, τ_2 = 3 microsec; the repetition frequency of the sound pulse F_R = 1 kHz; the sensitivity of the receiving device u_{min} = 300 microvolt; the range of height of the sea waves measured $H_{3\%}$ = 0.2-10 m. A quarter-wave rod antenna was used as the antenna device, as well as trailing antenna in the form of a long wire drawn along the fuselage of the aircraft. The width of the radiation pattern of the antenna amounted to θ_a = 80-100°. The investigations were conducted at heights of 500-4000 m and speeds of 250-500 km/hr. The results of the experimental investigations displayed the possibility of measurement in the short-wave radio band of the height of sea waves from an aircraft, with rather high precision and are found in good accordance with theoretical results. Figures 4; references 12 Russian.

USSR UDC 621.317.7.085.36:621.317.7.088

CONCERNING AUTOMATIC CORRECTION OF AN ERROR OF THE RESULTS OF ANALOG-DIGITAL CONVERSION

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76, pp 62-70 manuscript received 3 Apr 75, final version 15 Jul 75

POPOV, V. P., Moscow

[Abstract] The problem of assuring the necessary precision of conversion under various conditions of operation of analog-to-digital converters (ADC) is a fundamental problem of measuring technology. Structural methods of increasing the precision prove to be promising. They are based on the introduction into a planned ADC of supplementary correcting equipment, among which an especial place is occupied by methods of automatic correction of error (ACE). The present work is concerned with an algorithmic approach to automatic correction of the random error of the results of conversion of an ADC, systematically and strongly correlated in time. The possibility is evaluated of the use of some ACE methods and an iterated method of ACE is studied. It is found that an error introduced into the final result of measurement by the ACE method, based on a piecewise approximation of an ADC function, strongly depends on a change of its local nonlinearity. The iteration method of ACE makes it possible to eliminate any single-valued, and with the presence of a device for analog summation, double-valued nonlinearity of an ADC, not introducing methodical error. The possibility is shown of a reduction of the precision of analog-to-digital conversion to the precision of two standard analog values. Figures 3; references 9 (Russian).

USSR UDC 621.317.76

EFFICIENCY OF PRELIMINARY FILTRATION DURING ANALYSIS OF THE SPECTRUM OF BAND-PASS SIGNALS

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 44-50 manuscript received 13 Aug 75

BABENKO, V. I., Kiyev

[Abstract furnished by source]

The effectiveness is shown of the use of limiting filters in discrete systems for processing a spectrum of band-pass signals. The special feature of such processing is the dependence of the error of measurement of the band-pass signal on the steepness of the fall-off of the frequency characteristic of the limiting filter and the magnitude of the interval of quantization. In order to assure minimum error, in addition to an increase of the steepness of the fall-off of the frequency characteristic of the filter, it is

necessary to select an interval of quantization which is determined by the discrete values of the corrected frequency band. A quantitative evaluation is made of error as a function of the selected interval of quantization and the steepness of the fall-off of the frequency characteristic of the filter which is used. Figures 2; tables 1; references 7: 6 Russian, 1 Western.

USSR UDC 621.317.76

METHODS OF DECREASING ERRORS OF MULTIPLICATION IN NUMBER-PULSE MULTIPLIER DEVICES OF LASER DISPLACEMENT MEASURES

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 87-92 manuscript received 16 Oct 75, final version 28 Feb 76

VEDERNIKOV, V. M., KIR'YANOV, V. P., and SHCHERBACHENKO, A. M., Novosibirsk

[Abstract] The counting-calculating devices of laser displacement measurers based on number-pulse multiplier devices (NPMD) are characterized by relatively simple circuit practice and a fairly high speed of response. However, the most wide-spread NPMD which put into practice either an iteration algorithm of multiplication or an algorithm of digital integration based on binary-decimal integrators with successive transfer, have a significant methodical error of multiplication, which amounts to several units of discreteness of readout of the results of measurements. On the whole the presence of this error impairs the metrological characteristic of laser displacement measurers and practically excludes the possibility of an increase of their resolution in the case of use of additional interpolations of fractional portions of interference bands. In the present paper three methods are considered for decreasing the error of multiplication in NPMD, achieving an algorithm of digital integration on a base of binary-decimal integrators with successive transfer. It is shown that the error of multiplication in the devices discussed can be reduced to a magnitude not exceeding one quanta or can be altogether eliminated. Figures 3; references 4 (Russian).

USSR UDC 629.197.7

PROCESSING OF MEASURING INFORMATION WITH THE AID OF A KALMAN FILTER FOR EVALUATION OF A TRAJECTORY OF MOVEMENT IN THE ATMOSPHERE

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 97-99 manuscript received 2 Mar 75, finished variation 7 Oct 75

MALYUTIN, YU. M., and POSTNIKOV, YE. V., Leningrad

[Abstract] This short communication is concerned with an experimental investigation by means of simulation on an electronic computer of some modifications of a Kalman filter for evaluation of the trajectory of an object making an uncontrolled descent in the atmosphere. It is concluded that with the use of a Kalman filter for evaluation of the trajectory of movement in the atmosphere, it is advisable to combine various methods for prevention of divergence of the filtration process caused by indeterminancy of representation of the aerodynamic parameters of the object. In the process the choice of an alternative modification of the Kalman filter can be substantiated by the results of simulation on an electronic computer. Figures 5; references 3: 1 Western translated into Russian.

EAST GERMANY

NEW HUNGARIAN TEST INSTRUMENTS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 23, Dec 76 pp 759-760

SCHLEGEL, W. E.

[Abstract] Brief descriptions and photographs are presented of some new Hungarian test instruments exhibited at the International Fair in Budapest, held 19-29 May 1976. From the Electronic Test Instrument Factory (EMG): the EMG 1465/1 digital voltmeter (TR-1672/1); the EMG 1117/8 function generator (TR-0461); the EMG 1568/2 portable oscillograph (TR-4655/2); the EMG-1554 service oscillocsope; the EMG-19640 automatic logic tester (TR-9584); and the EMG-19630 logic comparator and logic-state indicator (TR-9583). From VILATI [Electrical Automation Institute] in Budapest and Eger: a service tester for digital circuits (TTL-compatible). From the Hungarian Research Institute for Test Instruments (MIKI): The Minidata II system (a computer-supported test-data acquisition system using the EMG-666 small computer and the MISS [Minidata Software System] program packet). Figures 5; no references.

EAST GERMANY

THE INFORMATIONAL VALUE OF MEASUREMENTS OF EXTERNAL RADIATION EXPOSURE IN THE CENTRAL PERSONAL-DOSIMETRIC MONITORING OVER HANDLING OF RADIOACTIVE SUBSTANCES

East Berlin KERNENERGIE in German Vol 19 No 11, Nov 76 pp 345-346 manuscript received 31 Mar 76

ROTHE, W., State Bureau for Nuclear Safety and Radiation Protection in the German Democratic Republic, East Berlin

[Abstract] The optimum wearing locations of personal-dose monitors for measuring the external radiation exposure were determined. Thirty-one persons working in various jobs in industry and research institutions, involved in the handling of radioactive substances, were tested with thermoluminescence detectors. Eleven locations were evaluated to establish the best location(s) for obtaining dependable information about the total-body dose rate. Optimum location was the center of the chest. The radiation dose rates measured there

are in proportion to the rates over the entire body. For more precise information, additional monitors may be placed at the head, the lower extremities, and the back. The hands are not monitored; however, from the dose rate at the chest, no dependable information about the exposure on the hands can be obtained. If this is needed, special measures must be employed. Table 1; references 9: 4 German and 5 Western.

EAST GERMANY

FIELD STRENGTH MEASURING STATION FSM 8 AND ITS USE FOR MEASUREMENT OF USEFUL AND INTERFERING FIELD STRENGTHS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 21, No 76 pp 690, 699-700

GROSSKLAGS, G., graduate engineer, Test Electronic Works State Enterprise, East Berlin

[Abstract] The FSM 8 field strength measuring system is capable of measuring useful and interfering field strengths, voltages, and interfering voltages in the 30 to 1,000 MHz range. The central unit of the system is the test receiver, the selective voltmeter SMV 8. Other components include the antennas, capable of receiving the entire frequency range of the instrument and various adapters and fitting components. The selective voltmeter SMV 8 is illustrated with a circuit diagram. It has seven ranges. The station may also use networks to permit the measurement of interfering voltages which develop at the line connections of three-phase units. These networks contain three low-pass filters. There are two different field-strength measuring dipole antennas, for 20 to 300 MHz and 300 to 1000 MHz, respectively. Four configurations are available: for useful and interfering field strengths, and for useful and interfering voltages. Special attachments are also available. Figures 4; references 9 (German).

USSR UDC 621.372.2

OPTIMUM SYNTHESIS OF COMPONENT TOLERANCES FOR THIN-FILM HYBRID CIRCUITS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2377-2384 manuscript received 4 May 75

KRIVOSHEYKIN, A. V.

[Abstract] The problem of the synthesis of component tolerance for thin-film hybrid integrated circuits is considered, the optimum solution of which makes it possible to reduce the cost of microcircuits. This problem reduces to the problem of nonlinear programming which has a statistical nature. Wide use of an electronic computer made it possible in practice to raise the problem of a search for a solution, optimum in a specified sense. However, as shown in the literature, existing methods of mathematical search assure at best finding a locally-optimum solution. This indicates that a search beginning from a start point leads to a solution, better (in the sense of a specified criteria) than for a specified start point in some local neighborhood. Thus in the multiextremal case there is no guarantee that from a specified start point a search leads to the best of all extremal values. Derivation of the best solution is assured only for problems which have a unique solution. Under these conditions an investigation of the properties of the solution of the problem set acquires a particular value. The author thanks A. F. Beletskom, A. A. Lanne and P. A. Arutyunov for helpful observations expressed during discussion of the work. References 14: 9 Russian, 5 Western.

ROMANIA

PROPORTIONAL-INTEGRAL BLOCK ACHIEVED WITH INTEGRATED CIRCUITS

Bucharest ELECTROTEHNICA ELECTRONICA AUTOMATICA in Romanian Vol 20 No 4, 1976 p 188

NITU, C., dr. of engineering, Polytechnical Institute, Bucharest

[Abstract] An integrated circuit for operational amplifiers is described. Advantages involve obtaining the proportional and integral components with a zero coefficient of interdependence. The technical characteristics of the control block, used in a facility for the control of temperature in electric furnaces with silite resistance are the following: the integration constant T_4 can be varied within the limits of 0-5 min, the precision class 0.5 under the conditions of variation of ambient temperature within the limits of +5°C-+45°C, the variable input voltage (alignment error) and the output voltage within the limits of 0-10 V. For the tuning parameter, the proportionality band, in the industrial application described, the approach involved varying a proportionality coefficient within the grid control layout of thyristors in the circuit of the heating resistance. Figures; references 3 (Romanian).

HUNGARY

TOLERANCE CALCULATION OF MECHANICALLY TUNED MICROWAVE DEVICES

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 16 No 1, Jan 77 pp 3-6

NAGY, MATHE JANOS, staff scientist, Telecommunications Research Institute

[Abstract] In order to calculate the tolerances which are permissible in microwave devices from the design dimensions and electrical parameters, the effects of the deviations on the device's performance must be known. Expressions to characterize there relationships may be derived with the aid of the differential equations of the electromagnetic space theory and the Maxwell equations; they unambiguously describe the characteristics of the microwave field. The calculations may be performed by perturbation and variation computations, or by simple derivation. The applications of these procedures were illustrated with two examples. One involved a band-limit filter and the other an adjustable tuning bar system. Measurement of the effects of deviations may be accomplished by connecting special instruments to the devices. Figures 5; references 3: 2 Hungarian and 1 German.

USSR UDC 621.391.2

COMMON STATISTICAL CHARACTERISTICS OF AMPLITUDE, ANGLE AND RANGE NOISES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2418-2420 manuscript received 29 Sep 75

BASALOV, F. A.

[Abstract] It is known that during radar tracking of a spatially-extended object, angular (azimuth and elevation) and range errors appear in all coordinates. Discovery of a statistical connection of these errors among themselves and with the amplitude of the total signal is of practical interest. For a solution of this problem it is necessary to know the common statistics of the parameters mentioned above. The present short communication calculates and analyzes the common four-dimensional density of distribution of the amplitude of the signal, angle and range noise at corresponding moments of time, together with its special cases. References 5 (Russian).

USSR UDC 621.391.2

ORTHOGONAL BASIS TRANSFORMATION OF A COMPLEX HARMONIC REPRESENTED AS A POINCARE SPHERE

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2398-2400 manuscript received 4 May 75

DAVIDCHEVSKIY, YU. I.

[Abstract] A Poincare sphere, widely used in analysis of the polarization of light, antennas and radio signals, commonly appears as a convenient method of representation of forms of polarization and orthogonal polarizations for a harmonic wave. In the present paper it is shown that a Poincare sphere also serves as a spatial nomogram of the parameters of the orthogonal basis transformation of a complex harmonic. The results obtained have an especial role in the analysis of polarized modulation (PM). This form of modulation is specifically for complex harmonics. PM can be considered as relative to AM or (and) FM base harmonics. Then the Poincare sphere is converted into a natural nomogram of the PM. Figures 3; references 8: 6 Russian, 2 Western.

USSR UDC 621.391.2

INVARIANT DETECTION OF A SIGNAL BY THE RECEIVING DEVICE OF A MONOPULSE RADAR

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2315-2320 manuscript received 5 Jun 75

KAGAN, A. M., and PUS', V. V.

[Abstract] Recently, increasing interest has been shown in the development of methods of detecting a signal under conditions of a priori indeterminancy, when some parameters of the signal and noise, on the background of which detection is performed, are unknown. Among various methods for construction of criteria, excluding unknown (interference) parameters, a special place is taken by the principle of maximum probability proposed by J. Neyman and E. S. Pearson [BIOMETRIKA, 1928, 20A, 1-2, 175-240, 263-294]. For many concrete problems the principle of maximum probability uniformly leads to the most power (UMP), UMP unbiased and UMP invariant criteria. In particular, in the situation considered in the present paper--that is to the problem of detecting a signal by the receiving device of an amplitude sum-difference monopulse radar (taking account of the information of the amplitude and angle-measuring channels)--the principle of maximum probability leads to criteria optimum to natural classes. A criterion is constructed, the statistics of which do not depend on the interference parameters of the problem. References 9: 4 Russian, 5 Western.

USSR UDC 621.391.2

SOME CHARACTERISTICS OF COVARIANCE SCATTERING MATRIXES IN DIFFERENT POLARIZATION BASES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2415-2417 manuscript received 24 Sep 74

KOZLOV, A. I., and DEMIDEV, YU. M.

[Abstract] Creation of electronic devices for control of the polarization of radiated electromagnetic waves and rearrangement of the polarized bases in transmitting and receiving terminals, with the object of improvement of the energy characteristics of radars and the solution of certain problems of selection, requires knowledge of the properties of radar targets in different polarization bases. In connection with this, the present brief communication studies some characteristics of covariance scattering matrixes. The authors thank D. B. Kanareykin for a statement of the given problem and discussion of its results. References 2 (Russian).

USSR UDC 621.391.2

COMPARISON OF ONE-STAGE AND TWO-STAGE PROCEDURES FOR A SEQUENTIAL SEARCH FOR A COMPOUND NOISE-LIKE SIGNAL

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2420-2422 manuscript received 1 Sep 75

KUZNETSOV, YU. S., SOBOLEV, A. A., and STANKEVICH, YU. A.

[Abstract] One of the possible methods for elimination of the time ambiguities of a noise-like signal is a sequential (step-by-step) search, the essence of which involves sequential scanning of all possible time positions in the limits of the range of ambiguities. A reduction of the search time can be attained by use of a two-stage analysis procedure in each time position. The present short communication compares one- and two-stage procedures with optimally selected parameters and a fixed probability of false capture, identical for both procedures. Tables 2; references 4 (Russian).

USSR UDC 621.391.2

THE COINCIDENCE OF STRUCTURAL INTERFERENCES IN RADIO ENGINEERING SYSTEMS WITH DISCRETE FREQUENCY SIGNALS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2422-2425 manuscript received 1 Oct 75

VARAKIN, L. YE.

[Abstract] Discrete frequency (DF) signals are widely used in radio engineering systems. This is accounted for by the fact that the frequency-time structure of such signals makes it possible, first, relatively simply to form and process DF signals with bases on the order of 10^2-10^4, and, second, efficiently to struggle with interference, the structure of which is similar to the structure of a DF signal. System, radio relaying, and simulated interference can be related to structural interference. The present short communication is concerned with determining the number of coincidences of the elements of a DF signal with structural interference. Random structural interference and structural interference with optimum DF signals are discussed. The dispersion of the number of coincidences for optimum DF signals was not found. However, there is reason to assume that its principle of change is close to the change of dispersion. In any case, with an increase of λ the dispersion of the number of coincidences must approach zero because the probability of affection of all M of the elements approaches unity in its turn. Figures 2; references 4 (Russian).

USSR UDC 53.085.3

CONTROL CIRCUIT OF LIGHT-EMITTING DIODE DIGITAL DISPLAY USING INTEGRATED CIRCUITS

Novocherkassk IZVESTIYA VYSSHIKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 11, 76 pp 1289-1290 manuscript received 9 Mar 76

MUTTER, VALENTIN MIKHAYLOVICH, candidate of technical sciences, senior collaborator Northwest Correspondence Polytechnical Institute, TSYLEVA, ZINAIDA ALEKSANDROVNA, engineer, Northwest Correspondence Polytechnical Institute, SHABER, VIKTOR MIKHAYLOVICH, graduate student, Northwest Correspondence Polytechnical Institute

[Abstract] The circuit is presented of a decoder for a seven-section display based on IS155 integrated circuits, as well as a table of the value of signals at the outputs of discrete units. The table also shows the symbols which are indicated. Figures 1; tables 1; references 2 (Russian).

USSR UDC 621.314.632.014.001.24

CHOICE OF THYRISTORS ON THE BASIS OF CURRENT WITH COMMUTATION TAKEN INTO ACCOUNT

Moscow ELEKTRICHESTVO in Russian No 12, Dec 76 pp 41-45 manuscript received 9 Sep 75

ZBOROVSKIY, I. A., candidate of technical sciences, and GOL'DIN, R. G., Sverdlovsk

[Abstract] In the paper a method is proposed for a choice of thristors on the basis of current, with commutation of (semiconductor) rectifiers [Ventil'] taken into account, and on the basis of the concept of an equivalent current (EC), the rated power of a rectifier converter (RC) is introduced, which makes it possible to compare RC with various circuits and to choose the optimum variation. As in a previous paper by I. A. ZBOROVSKIY [Elektrichestvo, 1973, No 9] an ideally smoothed rectified current is assumed and a linear thermal model is considered. A method is developed for determining the effect of commutation of rectifiers on the temperature of the semiconductor structure in a steady-state regime with a trapezoidal shape of the current through the thyristor. The EC of a RC is considered in two ways: the EC of a RC for thyristorized electric drive; and the EC of a RC for an excitation system. (Both are a limited case with commutation of the rectifier taken into account.) Allowing for commutation of the rectifiers, the EC of the RC are reduced and the nominal currents of the thyristors are increased, which leads to a decrease of the number of parallel branches. The parameters of transient thermal characteristics are shown in an appendix. Figures 5; references 5: 4 Russian, 1 Western.

USSR UDC 621.382.019.3:621.391.822

FORECASTING FAILURES OF DIODES BY NOISE OF AVALANCHE BREAKDOWN

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 81-84 manuscript received after completion 13 Oct 75

KARBA, L. P., and UL'MAN, N. N.

[Abstract] A classification and a comparison are made of the oscillograms of the noise voltage in the prebreakdown region of silicon diodes with degradation of them in the process of reliability tests. During investigation of the devices, observable noise of an avalanche breakdown originated with a feedback current of 5--15 microamp; with an increase of the current it smoothly increased and with a current of approximately 100--200 microamp disappeared by virtue of a sharp decrease of the resistance in the p-n junction. During this, for the majority of the devices (zero group), the pattern of the noise voltage was observed in the form of uniform "grass." Externally such a noise signal is analogous to the thermal noise of resistors. In addition to the noise typical of silicon diodes in the prebreakdown region, there were specimens with anomolous noise effects. It was possible conditionally to divide these devices into four groups by the nature of the anomoly. Figures 5; tables 1; references 7: 1 Russian, 6 Western.

USSR UDC 621.382.32.001.2

CALCULATION OF SERIES OF CURRENT-VOLTAGE CHARACTERISTICS OF THERMOSENSITIVE ELEMENTS BASED ON FIELD-EFFECT TRANSISTORS WITH A CONTROLLING p-n JUNCTION FOR VARIOUS TEMPERATURE MEDIA

Minsk IZV.VUZ:ENERGETIKA in Russian No 10, 76 pp 132-134 manuscript received 14 Jul 75

KLOPOTSKIY, A. V., eng., and KRIVONOSOV, A. I., dr of technical sciences; Moscow Construction Engineering Institute imeni V. V. Kubyshev

[Abstract] In recent years a considerable number of works have been published, devoted to sensitive elements of automatic equipment with semiconductor sensor-modulators and field-effect transistors. However, they lack suggestions with respect to methods of calculating a series of current-voltage characteristics for various temperatures of the environment. Use of field-effect transistors as thermosensitive elements is of important interest, for the planning of which it is necessary to have available a series of current-voltage characteristics. In the present work a calculation is made of such a series of current-voltage characteristics of thermosensitive elements based on field-effect transistors with a controlling p-n junction, for various media. This is done on the basis of a methodology developed by the authors. The initial parameters for the calculation are the saturation current of the drain and the cutoff voltage, measured at a fixed

temperature and two voltages of the drain-source. A graph is shown of the change of the temperature sensitivity of a Type KP-103I field-effect transistor for various temperatures. Figures 2; references 3 (Russian).

USSR UDC 621.382.52

PECULIARITIES OF NOISE AND SIGNAL CHARACTERISTICS IN SILICON AVALANCHE PHOTODIODES UNDER STATIC AND DYNAMIC CONDITIONS

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2390-2397 manuscript received 14 Feb 75; after revision 6 Jan 76

KAMENETSKAYA, M. S., MANSUROV, A. N., and PELEZNEVA, I. A.

[Abstract] A procedure is proposed for calculation of the spectral density of the power of excess noise, the photoresponse power, as well as the signal-to-noise ratio for the initial stage of breakdown in all the p-n junction of an avalanche photodiode under static and dynamic conditions. An investigation of the noise characteristics of avalanche photodiodes under static and dynamic conditions and visual observations of radiation from the working area of the diodes confirmed that at the beginning of development of a breakdown in all the p-n junction, almost simultaneously formation takes place of the totality of "fast" microplasmas, which have similar breakdown voltages, and this is accompanied by the formation of the excess switching noise of these microplasmas. During this, correlation was observed in the behavior of the noise characteristics and the dependence N(U) for these diodes. Comparison of the noise characteristics of avalanche photodiodes with the noise characteristics of the individual microplasms with $\omega_0 \gg \lambda$ and $\omega_0 \ll \lambda$ shows that the magnitudes of λ for microplasms are different at low and high voltages. The investigation of the signal characteristics of a diode in the two conditions confirmed that in a dynamic condition with specific magnitudes of ω_0 and $\tilde{U}$ an increase is observed of the power of the detected signal in comparison with the static condition. Similar noise and signal characteristics were observed at the beginning of breakdown with respect to all the p-n junction for avalanche photodiodes which do not have low-voltage microplasmas. The authors thank V. S. Etikin for helpful discussions and N. M. Masleninkov for assistance in conducting the experiment. Figures 8; references 10: 8 Russian, 1 Western, 1 Japanese.

USSR UDC [621.382.233.026:621.314.632].001.24

CALCULATION OF PARAMETERS OF TRIGGER PULSES OF POWER THYRISTORS

Moscow ELEKTROTEKHNIKA in Russian No 1, Jan 77 pp 37-39

ROZOV, V. YU., engineer

[Abstract] The conditions are determined for turn-on of the thyristors of a converter with shaping of trigger pulses in the form of packets of rectangular high-frequency pulses with intervals between the pulses of the packet. The calculated dependences obtained make it possible, at a given recurrence frequency and on-off time of the pulses of the packet, to determine the optimum parameters of the pulses, which assures reliable triggering of the thyristors of the convertor. The method considered for control of the thyristors is noteworthy, because during its achievement single-cycle amplifiers and shapers are used, which substantially simplifies the output devices of the control system. Figures 2; references 6 (Russian).

EAST GERMANY

PULSE SHAPING WITH THE DIODES SAZ13 AND SA412 IN SNAP-OFF OPERATION

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 24, Dec 76 p 812-813

BECKER, WOLFGANG, graduate engineer, and FOMM, HELGE

[Abstract] The snap-off diode is an important component for the generation of pulses with rise times in the picosecond range. Since special snap-off diodes are still very expensive, conventional diodes were examined for their suitability for pulse generation. The rise times of the output pulses (snap-off times) were plotted against the storage times. The SAZ13 diode permitted snap-off times of 400 picoseconds to be achieved; a snap-off time of 600 picoseconds was still possible at a storage time of 3.6 nanosec. This means that a control pulse of 7 nanosec rise time may be steepened to 600 picosec as a result of the approximately identical storage charge. Rise times of 550 picosec were reached with the SA412. However, in this diode the storage time: snap-off time ratio was less favorable. It should be noted that the latter diode is much less expensive. Tests with the KA105 diode were also carried out; they showed a relatively long snap-off time of 1.5 nsec. Figures 4; references 2: 1 German and 1 Western.

EAST GERMANY

COOLING SYSTEMS FOR TRANSISTORS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 22, Nov 76
pp 717-721

ZIMMERMANN, RAINER, graduate engineer, Semiconductor Works Combine State Enterprise, Frankfurt (Oder)

[Abstract] A review is presented of cooling systems for low- and medium-power semiconductor devices. The theory is discussed on the basis of a thermal equivalent circuit of a cooled transistor. The effects of device surface, in terms of thermal conductivity, absorption coefficient, and configuration, are discussed, and the configuration of the cooling fins evaluated as a factor in cooling performance. Formulas are derived for the calculation of the cooling performance.Tabulated data are presented on cooling bodies, cooling profiles, and cooling-fin materials to assist the designer of a cooling system. Profiles for power transistors which are actually used are described and evaluated. Figures 9; tables 9; references 4: all German.

ROMANIA

UDC 621.319.53.014:621.317.333.83

SYNTHESIS OF A CURRENT PULSE GENERATOR IN APERIODIC REGIME

Bucharest ELECTROTEHNICA ELECTRONICA AUTOMATICA in Romanian No 8, 1976 pp 281-287 manuscript received 15 Aug 76

ARABADJI, PETRE, Research Institute for the Electrical Engineering Industry, Bucharest

[Abstract] The author plans to switch from the stage of analysis to the stage of synthesis of the current pulse generator in an aperiodic regime, in the case of a linear circuit. The equation in x is determined and discussed, the circuit on the basis of the solution of the equation $f(x)=0$ is synthesized, the stability of the circuit's response is analyzed, and a numerical application is pointed out. A function of the allowable tolerances for the parameters of the current wave, the method described supplies the whole possible range of the values of inductance and capacitance, function of the resistance of the circuit in an aperiodic regime. The method of synthesis is applied to pulse current generators with linear parameters and a fairly good approximation, for the circuits with nonlinear resistance but "linearized," by considering a linear resistance of a corresponding value or for the case in which it can be considered that in the interval of useful time, the voltage drop at the terminals of the nonlinear resistance is constant, as is the case of arresters. Figures 3; references 7: 2 Romanian, 5 Western.

USSR UDC 621.373.51

CONCERNING ENLARGEMENT OF THE LOCKING BAND OF AN OSCILLATOR

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 51-56 manuscript received 7 Mar 75

KATUSHKINA, V. M., MALYSHEV, V. P., and SHALAPANOV, A. V.

[Abstract] In the literature it is shown that it is possible to enlarge the locking band to reduce the slope of the phase characteristics (PC) of a Thomson oscillator, if the power of the locking signal is increased or the Q of the circuit system is reduced. For this purpose the writers propose to employ additional feedback with respect to high frequency. It is concluded that the additional feedback makes it possible to deform the PC of the oscillatory system of the oscillator with the corresponding shape changing the form of the PC of the locked oscillator, and the magnitude of the locking band. Using a delay line in the circuit of the additional feedback makes it possible to reduce considerably the slope of the PC and to expand the locking band, particularly with low Q_c, not changing the tuning and the regime of the oscillator. Experimental date concerned with the operation of such oscillators based on Gunn-effect diodes are presented. Figures 6; references 5: 1 Russian, 4 Western.

USSR UDC 621.373.444.1

POTENTIALITIES OF SAWTOOTH VOLTAGE GENERATORS WITH POSITIVE FEEDBACK

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 95-97 manuscript received 19 Jun 75; after completion 19 Jan 76

CHURBAKOV, A. V.

[Abstract] The possibilities are considered of a significant improvement of the characteristics of sawtooth voltage generators (SVG) with positive feedback. A SVG with a voltage source in the feedback circuit, as the equivalent of which a stabilitron serves with a current regulating two-terminal network, differs profitably from a SVG with capacitance positive feedback, from a SVG with a ballast resistor in the stabilitron circuit, as well as from a SVG with negative feedback and a SVG with a discharge (charge) across a current regulating two-terminal network; with a higher linearity of the sawtooth pulses, minimum time of reverse, economy, and compatability with integrated technology. Figures 2; references 3: 2 Russian, 1 Western.

EAST GERMANY

CAPACITIVE PULSE GENERATOR

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 24, Dec 76
pp 813-814

DEUTSCHMANN, GUENTER, graduate engineer, Soemmerda Office Machine Works of Zentronik Combine State Enterprise, Research Center

[Abstract] The theory, design, construction, performance, and applications of a capacitive pulse generator were described and illustrated with circuit diagrams, block diagrams, photographs, drawings, and oscillograms. The pulse generator provides the functional advantages of phase-sensitive systems in spite of its relatively simple design. It is used in a mosaic pin printer at a location where severe vibrations occur in use. The unit consists of a fixed and a rotating disk, both segmented. The disks rotate in respect to each other and the pulses generated are amplified. Approximately square pulses may be obtained. Figures 10; reference 1: German.

USSR

UDC 537.311

CONDITION OF ABSENCE OF REFLECTION OF PLANE WAVE BY A CONDUCTOR WITH A COVERED ABSORBENT LAYER

Novocherkassk IZVESTIYA VYSSHIKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian
No 11, 76 pp 1189-1196 manuscript received 18 Sep 75

KOLESNIKOV, ERIO VIKTOROVICH, doctor of technical sciences, Professor
Novocherkassk Polytechnical Institute

[Abstract] A condition is obtained in a form convenient for practical use, which must satisfy the thickness and parameters of the absorbed layer as a function of the wavelength. The discussion includes calculations concerned with the reflection coefficient, the condition of absence of reflection and graphic construction of the line of admissible values $\omega = \sqrt{\mu / \varepsilon_E}$.

For a layer with a substantial electrical permeability, nomograms are presented which make it possible to solve the problem without any calculations. Figures 5; reference 1 (Russian).

EAST GERMANY

DEFECT ANALYZER FOR MAGNETIC TAPE RECORDERS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 23, Dec 76
pp 752-756

PFORTE, BERND, Electronics Institute, Academy of Sciences of the German Democratic Republic

[Abstract] The defect analyzer for magnetic tape recorders described (and illustrated with circuit diagrams, block diagrams, and charts) operates on the basis of the principle that a specific bit pattern is recorded on magnetic tape and played back in the recorder. The signal is analyzed by the device to identify, classify, and localize any defects. A statistical binary noise, generated in a pseudorandom generator, is used. Pseudobinary noise has the advantages of natural noise, but it recurs periodically. The functions of the device are described; they include recording, playback, and defect analysis. The defects may be nonexistent, beat defects, bit defects, consecutive bit defects, and the like. The circuitry features means for auxiliary-beat generation, beat changeover, major defect recognition, simulated defect input, and manual beat generation. Each defect output controls a counter; individual bit defects, dual-bit defects, and beat defects are indicated by triple readout; major defects and naive defects are indicated by double readout. Figures 3; table 1; references 8: 1 Western and 7 German.

ROMANIA

UDC 621.318.3:621.317.72

COMPUTATION OF THE FORCE IN A.C. ELECTROMAGNETS IN THE SMALL AIR-GAP AREA

Bucharest ELECTROTEHNICA ELECTRONICA AUTOMATICA in Romania No 8, 1976
pp 294-298

POPESCU, MIHAI, Polytechnical Institute, Bucharest

[Abstract] The survey describes a method for calculating the force developed by the electromagnet in the small air-gap area in which the effect of the short-circuit turn is still apparent. Under specific conditions the model described permits the computation of the electromagnet in the area of influence of the short-circuit turn. The magnitude of the area of influence of the short-circuit turn for a given electromagnet was determined. It was of the order of magnitude of the small air-gap area designated δ^*. The computation of the force in the small air-gap area singles out the mode of its variation with the air-gap area. The computation of the force may be extended to the type E electromagnets under the same conditions. However, the mathematical expressions are cumbersome. The experimental verification confirms, in reasonable limits, the model proposed. The imprecision of the determination of some magnitudes is relatively great and the errors increase with the increase in the air-gap area. Figures 8; references 8 (Romanian).

USSR UDC 621.318.13:669(083.74)

A NEW STANDARD ON MAGNETICALLY SOFT ALLOYS

Moscow ELEKTROTEKHNIKA in Russian No 1, Jan 77 p 58

KAZARNOVSKIY, L. SH., candidate of technical sciences

[Abstract] GOST 10160-62 "Iron-nickel alloys with high magnetic permeability," approved in 1962, has been revised. GOST 10160-75 "Precision magnetically soft alloys" went into effect on 1 Jan 76. The new standard includes a wider range of materials than the former, because in addition to iron-nickel, iron-chromium, iron-cobalt and iron-nickel-cobalt alloys enter into it. With respect to the level of magnetic properties, the standard specifies three classes for each alloy: I Class--normal properties; II Class--increased; III Class--high. This makes it possible more reasonably to assign manufactured batches of metal among customers in conformity with actual requirements. As a function of the level and kind of the parameters which have been standardized, the alloys are divided into eight groups. The alloys in each group are listed in the paper. As a whole the standard reflects the advances of native metallurgy and metal research on magnetically soft alloys and will contribute to an increase of the quality of electrical machines, apparatus and devices.

USSR UDC 621.372.8

EFFECT OF NONUNIFORMITIES AT THE BOUNDARY OF A CORE AND AN ENVELOPE ON THE PULSE RESPONSE OF A TWO-LAYER LIGHT GUIDE

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 84-87 manuscript received 11 Nov 74; after completion 22 Dec 75

GINZBURG, S. A., MURADYAN, A. G., and TEUMIN, I. I.

[Abstract] On the basis of a ray (geometrical-optical) representation, the connection is established between the pulse response of a two-layer multimode fiber and the nonuniformities at the core-envelope boundary. In so doing, the factor is taken into account of the change of the angles of incidence and reflection in the case of the condition that absorption during reflection is absent. It is assumed that a light-emitting diode is used as the source of emission. Figures 2; references 6: 3 Russian, 3 Western.

USSR UDC 621.372.822

DIFFRACTION OF H_{10} WAVE AT BAR IRIS IN RECTANGULAR WAVEGUIDE

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 38-45 manuscript received 4 Feb 75

MODEL', A. M., and MUSSEL', K. M.

[Abstract] On a basis of the method of averaged boundary conditions, by means of the introduction of dipole currents, formulas are obtained which make it possible to determine the reflection coefficient of an aris consisting of n bars, located at equal distances from one another, with a precision of approximately 0.0001 and with high precision to calculate the parameters of irises, the reflection coefficient of which amounts to approximately 0.9995. Formulas are also obtained for the parameters of the equivalent circuit of this iris. Figures 6; references 5: 3 Russian, 1 Western, 1 Japanese.

USSR UDC 621.372.832.8

S-BAND MICROSTRIP Y-CIRCULATOR

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 p 2410 manuscript received 9 Apr 75

PARSAMYAN, S. S.

[Abstract] The results are presented of an experimental investigation of a broad-band Y-circulator intended for combined operation with regenerative amplifiers and other microwave devices. Figures 3; references 3: 1 Russian, 2 Western.

USSR UDC 621.372.852.4

CALCULATION OF BROAD-BAND CIRCULAR POLARIZER BY THE METHOD OF FINITE DIFFERENCES

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2292-2299 manuscript received 20 Jun 75

REDECHKIN, V. I.

[Abstract] Calculations and a theoretical investigation are made of a circular polarizer for operation at a high level of power with a fairly broad frequency band. The polarizer consists of pairs of metal insertions of triangular cross section with a height V_1 of the section, pairs of dielectric insertions also of triangular cross section with a height V_2 of the section and a dielectric constant ε, placed at opposite angles of a square waveguide with the dimension V of the walls of a cross section. The polarizer is excited by a field H_{10} with a cross component $\tilde{E}$ parallel to the wall of the cross section of the waveguide. The results are presented of a comparison of theory with experiment. On a basis of the calculations performed a choice is made of the structural dimensions of the polarizer elements. The practical applicability of the method of finite differences for calculation of similar devices is shown, even in the case of a fairly small number of mesh points. The simplicity of the algorithm devised makes it possible to adjust the program and to perform calculations with fairly complex boundary conditions. The author thanks Ye. A. Titov for discussions and valuable comments on the paper. Figures 5; tables 2; references 4: 3 Russian, 1 Western.

USSR UDC 621.375.2.029.64

EVALUATION OF THE EFFECT OF THE COUPLING BETWEEN THE CAVITIES OF A CHAIN OF COUPLED CAVITIES ON THE INTENSITY OF MODULATION OF AN ELECTRON BEAM

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2353-2358 manuscript received 30 Jun 75

BYKOV, A. P., and FILIMONOV, G. F.

[Abstract] The effect is considered of coupling with respect to the field between adjacent cavities of a chain of cavities (which is used as the delay line of a TWT) on the basic process of interaction of electrons and field. It is shown that the amplification mechanism of a chain of coupled cavities is primarily determined by the "klystron" regime of a cascade grouping of electrons. The greatest changes in the case of introduction of coupling are produced with a low Q of the system, when the process of cascade grouping is insufficiently effective. In this case, because of the introduction of coupling, an increase is possible of current amplification and a broadening

of the amplification band of the system. The results presented in the paper pertain to the first section of a TWT when excitation is accomplished by an exterior signal. However, it can be shown that they also remain valid for the intermediate section of the device. The authors thank T. B. Krichenko who did much work with respect to programming and check-out of the calculating program, as well as M. B. Tseytlin for useful discussion of the paper. Figures 5; references 8: 6 Russian, 2 Western.

USSR UDC 681.3.01:621.372.54

CONCERNING THE TRANSIENT PROCESS IN A DIGITAL FILTER WITH INCLUSION OF NOISE

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 90-92 manuscript received 30 Jan 75; after completion 5 Sep 75

PETROSYAN, S. S.

[Abstract] A steady-state normal distribution of noise with an energy spectrum $W(\omega)$ is supplied at the input of a filter at the moment $t=0$ and it is required to find the principle for determining its dispersion at the output of low-pass and high-pass filters. Convenient relationships are derived for determining the pulse response of a digital filter of any structure and on their basis the transient processes with the inclusion of noise are thoroughly analyzed. Figures 2; references 2 (Russian).

HUNGARY

FILM (LAYER) POTENTIOMETERS. PART I

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 16 No 1, Jan 77
pp 14-17

GALAMBOS, GYULA, and Mrs URBAN, LAJOS, Remix Radio-Engineering Enterprise

[Abstract] The authors discuss the various types of film potentiometers in general, and those manufactured by Remix Radio-Engineering Enterprise in particular, and describe the major properties of these potentiometers with the aim of assisting the designer of electronic devices in making the best selection among them for the intended purpose. The Remix film potentiometers are available in enamel-layer, metal-layer, and cermet-layer versions. Among the most important properties are mechanical durability, performance under continuous electrical loading, and operating temperature range. Insofar as function is concerned, layer potentiometers may be designed for adjusting or controlling functions. Proper design, for example proper selection of the track and tap unit, may contribute materially to reduction of noises generated by step voltages and transient resistivity fluctuations. The important characteristics are tabulated, giving the definition and the standard values (as specified in MSZ [Hungarian Standard] 1102/2. Figures 6; table 1; no references.

EAST GERMANY

OPTICAL ISOLATORS FOR LINEAR APPLICATIONS

East Berlin RADIO FERSEHEN ELEKTRONIK in German Vol 25 No 22, Nov 76
pp 740-741

[Unattributed article]

[Abstract] Optical isolators perform usefully when used to suppress noise and to interrupt undesirable ground loops in digital circuits. But they may also be used in analog circuits, where linear operation predominates. In a properly designed circuit, optical isolators may be used in sensor circuits, patient-monitoring devices, control systems, power supplies, and audio and video amplifiers. There are four types of optical isolator: photodiode isolator, photo-transistor isolator, logic-getter isolator, and transistor-amplifier isolator. The uses of these types are briefly described, and versions of d.c. and a.c. optical isolators are discussed. An analog isolator is used generally to transmit a small d.c. or a.c. signal from a circuit with a reference potential (ground) to a circuit with another reference potential, where there may be large potential differences or noise effects between the reference points. Figures 3; reference 1 (Western).

USSR

UDC 534.784

CALCULATION OF THE INTELLIGIBILITY OF SPEECH IN THE CASE OF SOME FORMS OF ITS PROCESSING

Moscow ELEKTROSVYAZ' in Russian No 11, 76 pp 66-70 manuscript received 3 Sep 74

SAPOZHKOV, M. A., METER, CH. M., and MLODZEYEVSKAYA, I. A.

[Abstract] The results are presented of an investigation of the amplitude and frequency distributions of the levels of a speech signal in three-octave frequency bands for cases of amplitude limitation and differentiation of a speech signal. It is found that during differentiation of a speech signal its dynamic ranges in narrow frequency bands almost do not change, and for the signal as a whole the range shrinks threefold. For a maximum amplitude limitation of a differentiated speech signal, the following are characteristics: [1) Regardless of the nondependence of the output level on the time for the signal as a whole, the dynamic range of the output levels in narrow frequency bands amounts on the average to 15-17 db, whereas in the same bands of unprocessed speech it is 36-38 db; 2) With some smoothing of both the spectral envelopes of speech sounds and the averaged spectral envelope with reference to an undistorted speech signal indications of a formant structure remain in the sound spectra; the decrease of an averaged spectral envelope to the high-frequency side is only reduced to 3-4 db/octive instead of 6-9 db/octive for unprocessed speech (the envelope of three-octive levels of a limited signal does not depend on the frequency). The form of the averaged input spectrum of speech has practically no effect on the form of the averaged output spectrum.] Calculation of the intelligibility was performed by a common method taking account of corrections for change of the dynamic range and the peak factor in the frequency bands, as well as equalizing of the frequency distribution. Figures 3; tables 3; references 3: 2 Russian, 1 Western.

USSR UDC 621.391.883.3

EFFECT OF OPERATING CONDITIONS OF SPEECH DETECTORS ON INTELLIGIBILITY

Moscow ELEKTROSVYAZ' in Russian No 11, 76 pp 71-73 manuscript received 19 Nov 75

SLASHCHEV, V. N., and PETROVA, M. Z.

[Abstract] A description is given of the manner in which experimental data were obtained. These data make it possible to establish the dependence of syllabic intelligibility of speech on the threshold pick-up, the pick-up time and the release time of a speech detector intended for separating out of active and passive sections in an incoming speech signal and distribution of the respective signals into the logic unit of the control system. The limits are determined of the change of operating conditions of a speech detector from the point of view of the permissible magnitude of distortion of the speech signal. The data obtained can be used as magnitudes regulating the maximum permissible quality of speech transmission from the position of intelligibility during development of speech detectors which have different work algorithms. Figures 5.

USSR

UDC 621.372.8

HIGHLY-SENSITIVE JOSEPHSON POINT-CONTACT DETECTOR IN AN OVERSIZE WAVEGUIDE FOR 1.5-2 mm WAVELENGTH

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2385-2389 manuscript received 12 Jun 75

KORCHUGANOV, V. P., LYUBIMOVA, T. F., and ETKIN, V. S.

[Abstract] The results are presented of an experimental investigation of a broad-band detector, intended for radio astonomy observations in the 1.5-2 mm range of wavelengths, which is used as the input cascade of a radiometer. The Josephson superconducting point-contact detector which was developed operates in a broad-band regime in an oversize waveguide. The volt-watt sensitivity of the detector $dv/dp = (1\text{-}1.5) \times 10^4$ v/w. A low-noise low-frequency amplifier with a matching filter at the input was used as a second cascade of the radiometer. The sensitivity of the radiometer equalled $\Delta T = 0.15\text{-}0.2°$ K, losses at the input channel amounted to $\sim$6 db, and consequently with them the decrease of sensitivity amounts to 0.05-0.035°K. In the band $\Delta f/f = 25\%$ this corresponds to a threshold sensitivity of 10^{-14} watt-$hz^{-1/2}$. Construction of the detector is fairly compact. The possibility of operation with such detectors in a transport Dewar flask shortens by several times the expenditure of helium. A block diagram is shown of the device for measuring the volt-watt sensitivity of the detector and the sensitivity of the radiometer. The authors thank Ye. M. Gershenzon for useful discussion of the work. Figures 3; references 7: 6 Russian, 1 Western.

USSR

UDC 535.323

RESONANCES IN A SOLID BODY AND OPTICAL RECORDING OF INFORMATION

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 31-34 manuscript received 2 Feb 76

BELINICHER, V. I., and MALINOVSKIY, V. K., Novosibirsk

[Abstract] The possibility is considered of using resonance effects with production of excitrons in solid bodies for recording of optical information. There is a significant limitation on the quality of the crystal to be used: the inhomogeneous broadening of the optical line caused by defects must be smaller than the shift (splitting) of the line by an external field. It is necessary that the quality of the crystals be such that the inhomogeneous broadening of the line be 10^{-5} ev, i.e., by an order of magnitude smaller than exists at present. Creation of such crystals presents a pressing technological problem. It is shown that optical resonances in solid bodies can be efficiently utilized for the objectives of optical memory. In so doing, the conditions necessary to fulfill are quite rigorous: great purity and homogeneity of the material, low temperatures, and the availability of lasers with a narrow line of suitable frequency. Figures 1; references 6: 5 Russian, 1 Western.

USSR

UDC 539.216.2:537.525.92

TRANSIENT PHENOMENA IN DIELECTRIC LAYERS (REGION OF STRONG FIELDS)

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 12-20 manuscript received 27 Feb 76

KOSTSOV, E. G., Novosibirsk

[Abstract] Because dielectric layers are one of the principal elements of contemporary microelectronics, investigation of the transient electrophysical processes in such layers is of practical interest; furthermore such processes carry considerably more information as compared with steady-state methods of investigation concerning effects taking place in a solid body. The present paper considers the special features of a transient current of thermoelectron emission facilitated by an electric field, taking account of the penetration of the field of the forces of a mirror image into the dielectric, and of the capture of electrons by local centers and the Joule heating of the specimens. The author thanks G. I. Gladyshev and A. O. Makhotkin for assistance in conducting the numerical experiment. Figures 7; references 8: 5 Russian, 3 Western.

USSR UDC 62-506.9:621.37

MACHINE INVESTIGATION OF STATIONARY CONDITIONS OF RADIO ENGINEERING SYSTEMS WITH LITTLE A PRIORI INFORMATION

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 21-28 manuscript received 7 May 73; after completion 2 Apr 76

RIZKIN, I. KH.

[Abstract] The success of a machine investigation of radio engineering systems and radio electronic circuits is determined to a considerable extent by the volume, nature of assignment and the method of utilization of information concerning the system under study, which the investigator intends to have available before application to an electronic computer. In particular, it is possible to use this a priori information for some optimum choice of the initial values, first approximations, evaluation of the anticipated expenditures of machine time, choice of procedure and its parameters, etc. Unfortunately, in many radio engineering problems, particularly those which arise during study of complex systems, a priori information proves to be very meager. Under these conditions the investigator usually intuitively selects the method of calculation and the parameters of the calculating scheme. The present paper formalizes this approach, which makes it possible quantitatively to estimate the machine time, to compare various methods and optimally to select initial values, functions, etc. It is found that the proability treatment of a priori information concerning the system under study on an electronic digital computer makes it possible to answer (probability) a number of questions connected with the anticipated machine time, and optimally to choose the initial information introduced into the electronic digital converter at the beginning of calculation. Methods are proposed for forming and processing of a priori information and its use for solution of the problems cited. An example is presented which pertains to a calculation of a periodic regime in self-contained and nonself-contained radio engineering devices. Figures 4; references 3 (Russian).

USSR UDC 681.142.38:681.142.2:681.142.4

CONCERNING THE COMPUTATIONAL CAPACITY OF MICROPROCESSORS

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 76-83 manuscript received 27 Jan 75

ZAMORI, Z., OSOSKOV, G. A., KHORVAT, A., Moscow

[Abstract] A brief description is presented of the INTEL-8080 microprocessor manufactured by the Intel Corporation, Santa Clara, California, and the operation of its commands. The concept of internal performance of an electronic computer is introduced, a method for its calculation is given, and an evaluation of this parameter for the INTEL-8080 microprocessor is made on the basis of the "Gibson-III" mixture of commands. The statistical weights for the "Gibson-III" mixture, obtained during the solution of a large number of scientific-technical problems, are shown in table form. The computational capacity is shown of various electronic computers (including the Soviet "Minsk-32" and the "BESM-6") computed according to the "Gibson-III" mixture of commands. Tables 2; references 14: 3 Russian, 11 Western.

USSR UDC 681.142.71

OPERATIONAL CONNECTION OF "MINSK-32" AND "ELEKTRONIKA-100" ELECTRONIC COMPUTERS

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 106-108 manuscript received 2 Dec 74

BEKKER, M. B., GORYACHKIN, V. I., LEONT'YEV, V. V., RYABOV, YU. F., and TETEN'KIN, V. A., Leningrad

[Abstract] The creation of centralized multimachine systems, including in their composition electronic computers of various classes, is one of the promising directions for use of electronic computers in automation of scientific investigation. The developed connection between the multiprogram electronic computer "Minsk-32" and the small electronic computer "Elektronika-100" can serve as an example of such a system. The present short communication considers a connecting structure for the two computers, the organization of exchange, and a block diagram of the coupling device, the functional units of which are described. Figures 2; references 3 (Russian).

USSR UDC 681.142:621

CONCERNING ONE METHOD OF EXPERIMENTAL DETERMINATION OF THE DYNAMIC PROPERTIES OF HIGH-SPEED ANALOG-TO-DIGITAL CONVERTERS

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 83-87 manuscript received 9 Oct 75

BELOMESTNYKH, V. A., V'YUKHIN, V. N., and KASPEROVICH, A. N.

[Abstract] The procedure and the equipment for realizing this procedure considered in the paper are based on a visual comparison of the form of the signal at the input of the analog-to-digital converter (ADC) and the signal recovered by readout of the ADC with the aid of a standard digital-to-analog converter (DAC). In addition to the DAC the equipment includes a stroboscopic oscillograph, a signal generator and an adjustable delay device. The method describes is simple, does not require much equipment, is descriptive, can be used during tune-up and adjustment of an ADC, considerably expands the functional possibilities of checking, and makes it possible to determine the values of the boundary parameters of the ADC in question (in particular the minimum possible time of conversion). Figures 4; references 1 (Russian).

USSR UDC 681.325

"IMPULSE" SYSTEM FOR RECORDING OF RAPID PROCESSES

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 105-106 manuscript received 15 Apr 76

ANISIMOV, A. P., KORNILOV, V. V., KUKLIN, G. N., PORTASOV, V. S., POTYLITSIN, G. P., SEDOV, A. I., and SHKORKIN, V. I., Moscow

[Abstract] This brief communication describes the "Impulse" system for recording of rapid processes, which is intended for measurement and conversion into discrete form of the signals of rapidly occurring processes with subsequent recording of the data on punched tapes and introduction of them into an electronic computer. The system is used for study of rapidly occurring processes during biophysical investigations, for analysis of the kinetics of rapid biophysical processes, as well as in other areas of high-speed spectroscopy. It is used in scientific-research laboratories during investigation of rapidly occurring processes. The system can operate in an independent regime as a device for collection and encoding information in the composition of a multilevel system of collection and processing of data. Because of use in a system of equipment, performed in standard CAMAC, the system can be expanded and modified in accordance with the requirements of the experiment. In the system, the minimum duration of the registering process is 50 ns; the number of conversion points is 100; the number of conversion levels is 128; and the overall equipment error of measurement is not more than 10 percent. Figure 1.

USSR

UDC 681.325:621.378

THRESHOLD OPTICAL LOGIC ELEMENT

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 93-94 manuscript received 2 Feb 76

KOSTSOV, E. G., and POTAPOV, A. N., Novosibirsk

[Abstract] An optical logic element is considered, in which a threshold photodetector is used as a threshold converter. The circuit of the element consists of an avalanche phototransistor; a light modulator based on a crystal which has a linear electro-optical effect; a capacitance C, an energy storer formed by the electrodes of the crystal; and a switch. The sequence of functioning of such an element (operating cycle) is presented in a paper by E. G. Kostsov, et al [AVTOMETRIYA, 76, No 4, pp 3-6]. The form of the logic function which has a place at the output of the element is determined by the number of its inputs and by tuning of the modulator (increase of the passage of the light flux during an increase, or on the contrary during a decrease of the voltage at the modulator). Figures 3; references 3 (Russian).

EAST GERMANY

BYTE-SERIES, BIT-PARALLEL INTERFACE. INTRODUCTION

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 24, Dec 76 pp 786-788

BAUMANN, WALTRAUD, graduate engineer

[Abstract] The byte-series, bit-parallel interface described (and illustrated with block diagrams and charts) is of the line-interface type, and permits the connection of up to 15 functional blocks to the bus. Sub-addressing within the functional blocks is made possible by more than 32 second addresses. The maximum data rate is 1 megabyte per second. When fully utilizing the total length of the transmission path, which is given as 20 meters, this is reduced. The interface operates in an asynchronous manner. The functional blocks are combined into a system by means of a shielded cable and 25-pole connectors. The cable contains all lines required for message transmission and the ground (reference potential) wires. The electrical conditions of the interface are based on the levels, switching times, and load factors of the TTL technique. A typical system, consisting of control unit, programmable test-site selector, non-programmable digital voltmeter, and a printer will perform the following functions: programming the test-site numbers, canceling the digital voltmeter, start the digital voltmeter for measuring, print the test-site number and measurement result, issues SRQ if the test range is exceeded, and permits the switchover of the control unit to manual operation. Figures 3; tables 4; references 2: 1 German and 1 Western.

HUNGARY

COMPUTER-AIDED PREPARATION OF THE PROGRAM CARRIERS OF NUMERICALLY CONTROLLED MACHINERY

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 16 No 1, Jan 77 pp 7-9

PERENYI, EDE, graduate instrument and precision-mechanical engineer, Hungarian Association of Communication Engineering

[Abstract] There are increasing numbers of numerically controlled machines in Hungary. So far, the computer-aided preparation of their program carriers was too costly; however, now it became necessary to coordinate the various computer systems, post-processors, and programming methods to permit full and efficient utilization of these machines. In order to facilitate this development, the author reviews briefly the details of a small number of solutions employed in foreign countries. These originate from the following

companies: Data Systems, Inc., in Ann Arbor, Mich; Manufacturing Data Systems; International Computers Limited (one of this firm's AGIECUT DEM 15 cutter is in operation in Hungary); Matchless Machines Ltd. (which feature the AGIEPAC program); Tridea Electronics in El Monte, Calif. (Altage system), and the Hewlett-Packard system using this firm's minicomputers such as the HP 9830 A, Model 30. Figures 2; no references.

EAST GERMANY

THE ELKA 51 BENCHTOP COMPUTER

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 23, Dec 76 pp 776-777

[Unattributed article]

[Abstract] The ELKA 51 benchtop computer is a third-generator device made by Orgtekhnika Silistra in Bulgaria. This type replaces the ELKA 50, which has been imported to the German Democratic Republic. The new model has a somewhat different housing and color scheme; it now may be tilted to provide better visibility of the display. It is intended for use as an office calculator; it can add, subtract, multilpy, divide, automatically divide or multiply with a constant, raise to power, and perform memory calculations. It has an "add-memory" button, and also a 5/4 button which provides automatic rounding. The DP button may be used to preset the number of digits required for the answer to a problem. The power supply unit, the computing and display circuit boards, and the keyboard, which are the major functional units, are briefly described. The overall evaluation of the device is favorable. Figures 2; no references.

USSR

UDC 551.501:527

METHOD OF PROCESSING RESULTS OF PHOTOGRAPHY BY OPTICAL MEANS OF COSMIC OBJECTS ON A BACKGROUND OF STARS

Novosibirsk AVTOMETRIYA in Russian No 5, Sep/Oct 76 pp 58-62 manuscript received 24 Feb 75; final version 3 Oct 75

YAKUSHIN, S. M., Astrakhan'

[Abstract] The paper considers the use of ballistic cameras, one of the principal forms of optical means for study of the movement of cosmic objects (CO) in space, for photography of CO on a background of stars. During processing of the results of photography it is necessary to make an identification of the stars on the photograph with the aid of a star catalog. An algorithm for automatically doing this is proposed, with the assumption that the coordinates of the optical center, known with a precision accurate to Δ (e.g., $\Delta \leq 10°$), are given in a horizontal system with an astronomical azimuth $\tilde{A}_0$ and a zenith angle $\tilde{Z}_0$. The identification is made with the aid of one point--the center of the photograph ($x = y = 0$). Two methods of determining the angular coordinates of a KO on a base of identified stars are presented. Tables 1; references 5 (Russian).

EAST GERMANY

BEHAVIOR OF VARIABLE RESISTORS, SWITCHES, AND CABLE SYSTEMS UNDER SHOCK-LIKE LOADS

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 24, Dec 76 pp 791-792

KOEHLER, E., and HEEG, K.-H., graduate engineers, Institute of Control Engineering

[Abstract] Variable resistors, switches, and cable systems were tested for shock loads by dropping them from heights of up to 1 m at an acceleration of approximately 750 G, under a shock duration of 1-35 msec, over a number of surfaces. A special apparatus was designed for these tests. Tested were: wirewound resistors, resistors with shaft, layer resistors, microswitches, luminous pushbutton switches, and the like. Layer and shaft resistors showed resistance changes for 1-5 drops and none thereafter. Wirewound resistors changed their resistance depending on the acceleration employed in the test. All resistance changes were such that the final values remained in the specified tolerance range. For all switches, the performance change was dependent on the shock duration. The "critical shock duration" was 10 msec. Above this duration, the damage was significantly greater. Microswitches switched when subjected to an acceleration of 15 G. Figures 9; no references.

EAST GERMANY

DETERMINATION OF THE MECHANICAL AND DYNAMIC STRENGTH OF ELECTRICAL COMPONENTS ON CIRCUIT BOARDS

East Berlin FEINGERAETETECHNIK in German Vol 25 No 12, Dec 76 pp 531-533

LINDNER, H., graduate engineer, RFT Communications Works Combine State Enterprise, Leipzig

[Abstract] The method described permits the evaluation of the attachment of a component to the circuit board panel (it does not cover the evaluation of the structural strength of the component itself). The most frequent cause of strength failure is vibration. Impact-caused failure can also be regarded as an extreme cause of vibration-caused failure through an equivalence concept. The procedure for a systematically algorithmizable procedure for the establishment of design parameters for the various strength classes involves the setting of the stress or test parameter, elucidation of the failure mechanism, preparation of the mechanical vibration model, calculation of the vibration parameters, determination of the shock-transfer, calculation of the stress in the spring element, and comparison with the permissible material parameters and design conclusions. These operations are carried out

with the aid of an electronic computer such as the ODRA 1013. Experimental checks confirmed the validity of the theoretical calculations. Use of the procedure will decrease the incidence of failures and will increase the reliability of the components manufactured. Tables 2; figures 2; references 9: 1 Russian, 7 German.

HUNGARY

ENCAPSULATION OF SEMICONDUCTOR DEVICES. PART III

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 16 No 1, Jan 77 pp 25-29

NENYEI, ZSOLT, dr, graduate chemical engineer, department head, United Incandescent Lamp Company, Corporate Semiconductor Development Department

[Abstract] This part of the series of articles discusses cooling means for semiconductor device capsules, high-frequency device capsules, capsules for integrated circuits, and encapsulating procedures. Cooling, or more precisely dissipation of the heat generated by the device, may be facilitated by the provision of vents, heat sinks, and heat-dissipating spacers. The properties of available spacers are presented in tabular form. Data on the scatter capacitance and inductance of commercially available high-frequency device capsules are also tabulated. The most widely used capsules for integrated circuits are the so-called TO-5 capsules, flat-pack capsules, and dual-in-line capsules. Special problems are created with large-scale integrated circuits with many connection leads. Devices such as the 2048 Bites Silicon Gate MOS 8702A from Intel company may be used in such cases. The information presented was taken from recent literature. Figures 7; tables5; references 9: 2 German, 1 Polish, and 6 Western.

HUNGARY

EVALUATION OF TEST DATA BY MEANS OF PROBABILITY CALCULATIONS. PART I

Budapest FINOMMECHANIKA MIKROTECHNIKA in Hungarian Vol 16 No 1, Jan 77 pp 10-13

RIPPEL, GEZA, main department head, Remix Radio-Engineering Enterprise

[Abstract] Because of the vast amount of data generated in the course of a thorough evaluation of series of electronic devices, they must be processed in order to make them manageable and to obtain overall information from them. Statistical methods are used for this purpose. This article, the first of a series, describes the elementary concepts involved in these methods. The following terms are discussed: variables, standard distribution, Student distribution, the average value of Student distribution, and comparison of two test series. Three figures; 4 references: 3 Hungarian and 1 Western.

USSR

CALCULATION AND MANUFACTURE OF FLAT COILS

Moscow RADIO in Russian No 11, 76 pp 40-41

YANKIN, YU.

[Abstract] Calculation of flat coils for use in ultrashort wave equipment, with a precision sufficient for radio amateurs, is possible with the aid of a nomogram. Nomograms for the calculation, and the constructive dimensions of a round and "square" coil are presented and discussed. Figures 3; tables 2.

USSR

ALKALINE ACCUMULATORS

Moscow RADIO in Russian No 11, 76 p 48

[Abstract] Various types of alkaline (nickel-cadmium and nickel-iron) accumulators--one of the most widely used self-contained sources of current for the supply of portable radio equipment--are described and illustrated. Graphs are presented of the discharge-temperature characteristics of nickel-cadmium and the charge-discharge characteristics of nickel-iron accumulators. Data are shown for 11 types of accumulators. Figures 4; tables 1.

USSR UDC 621.38

TO THE THEORY OF MECHANOTRON CONVERSION

Moscow RADIOTEKHNIKA in Russian Vol 31 No 11, Nov 76 pp 73-80 manuscript received 5 Nov 74; after completion 6 Oct 75

KOGAN, I. M., and ARSEN'YEV, O. A.

[Abstract] Conversion of the mechanical movements of the electrodes of an electrovacuum device into the electrical response of this device is commonly called electromechanical or mechanotron conversion. The present paper obtains general analytical dependences, which combine the movements of the electrodes with the electrical reactions based on such movements, not resorting to linear approximations of the operator of the conversion. The analytical expressions obtained make it possible to perform a conversion of the results of an experimental examination of the acoustic stability of electron tubes for various intensities of action. A number of non-rough assumptions make it possible to obtain very simple approximations of the operator of mechanotron conversion, appropriate for engineering calculations. Figures 4; references 6: 5 Russian, 1 Western.

USSR UDC 621.385.632

NOISE FACTOR OF TWT-O WITH A SLIGHTLY INHOMOGENEOUS MULTIVELOCITY ELECTRON STREAM

Moscow RADIOTEKHNIKA I ELEKTRONIKA in Russian Vol 21 No 11, Nov 76 pp 2344-2352 manuscript received 17 Apr 75

SHTYROV, A. I., and ROZANOV, A. V.

[Abstract] The authors feel that insufficient attention is paid in the literature to study of the noise properties of TWT amplifiers, taking into account such factors found in practice as inhomogeneity of the electromagnetic field, distribution of current density and the accelerating potential with respect to the cross-section of the electron stream, and the thermal scattering of the electron velocities. In the present work, on the basis of an electrodynamic concept, an attempt is made to take account of the effect of the factors enumerated above on the noise characteristics of a Type O TWT. Particular attention is turned to successive statistical determination of those macroscopic parameters which directly enter into a formula for the noise factor. A numerical evaluation is made of the effect on the noise properties of a typical Type O TWT of thermal scattering of the electron velocities, the inhomogeneity of the electromagnetic field and the distribution with respect to the cross-section of the beam, and of the static parameters (current density and accelerating potential). It is shown that within the limits of the assumptions made, the electrodynamic

representation of the noise factor can be determined in a form analogous to a conventional expression for the noise factor of a one-dimensional model with a correction factor, taking into account the contribution of the factors enumerated above. Numerical calculations on the basis of the formulas obtained show that the principal effect on the magnitude of the noise factor proves to be inhomogeneity of the electromagnetic field of the delay system (which is defined by the magnitude of the space factor, i.e., by the ratio of the radiuses of the flow and the spiral), the thermal scattering of the electrons with respect to energies, and to a lesser degree the inhomogeneity of the static parameters of the electron stream with respect to its cross section. Figure 1; references 6 (Russian).

USSR UDC 533.7

ELLIPSOID OF ROTATION IN HOMOGENEOUS QUASI-STATIONARY MAGNETIC OR ELECTRIC FIELD

Novocherkassk IZVESTIYA VYSSHIKH ZAVEDENIY: ELEKTROMEKHANIKA in Russian No 11, 76 pp 1184-1188

STEBLEV, YURIY IVANOVICH, assistant Kuybyshev Aviation Institute, SHATERNIKOV, VIKTOR YEGOROVICH, candidate of technical science, docent Kuybyshev Aviation Institute, and MINAKOVA, IRINA DMITRIYEVNA, engineer, Kuybyshev Aviation Institute

[Abstract] In the theory and practice of nondestructive checking of metal products, as well as during the creation of electromagnetic metal detectors, an analysis of secondary fields of local electrical conducting bodies of various forms and dimensions is very essential. For construction of a highly efficient system of checking and detection of conducting bodies of limited dimensions, information is necessary concerning the distribution of secondary electromagnetic fields in space which surround the object of checking and detection. The present paper considers a problem concerning an ellipsoid of rotation located in a homogeneous quasi-stationary magnetic or electric field oriented parallel to the axis of rotation of the ellipsoid. It is required to determine the secondary electromagnetic field and the distribution of the eddy currents of the ellipsoid. A solution is obtained by the Fourier method through radial spheroidal and associated Legendre functions of the 1st and 2nd kind. Some results of calculations are presented which make it possible to determine the dimensions of an induction converter of an electromagnetic metal detector. Figures 3; references 4 (Russian).

USSR UDC 621.311.4:621.316.1.064-52

CHARACTERISTICS OF AUTOMATIC-RESERVE-SWITCHING DEVICES OPERATING DURING A VOLTAGE OR FREQUENCY DROP

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 1, Jan 77 pp 14-15

VENSLOVAS, A. I., engineer Synthetic-Fiber Plant, Kaunas

[Abstract] The correct choice of automatic-reserve-switching devices, to match automatic motor starters prevents many shutdowns and thus ensures a reliable operation of industrial plants. Of interest are modern combination automatic-reserve-switching and starting devices which operate when a voltage or frequency drop occurs. Minimum-voltage time relays have been found universally effective here, their selectivity being determined on the basis of the appropriate holding time. Their response time is usually set so as to ensure no detrimentally long interruption of the technological

process. They are usually set for operation at 65-67 percent nominal line voltage. They are usually set for operation after the line frequency has dropped by 1.0 Hz, but unnecessary switching can be avoided by allowing the frequency to drop within the safe band to 47.5-48.5 Hz. Various interlocking schemes have been developed to ensure both fast and reliable operation of intersectional relays, with avoidance of false disconnects. Such an interlock, based on the frequency difference, has been combined with the automatic-reserve-switching system in the Synthetic-Fiber Plant in Kaunas. This fast-response system ensures adequate motor protection under most severe transients during antiphase switching. It has been in operation for the past eight years and there have been 21 occasions when it acted successfully. Figure 1; tables 1; references 2 (Russian).

POLAND

UDC 621.311.6:621.316.721

HIGHLY STABLE HIGH-POWER SUPPLY SOURCE

Warsaw POMIARY AUTOMATYKA KONTROLA in Polish Vol 22 No 10, Oct 76 pp 367-368

HALBSGUTH, ANDRZEJ, M. A., Engr., SZYMANSKI, ANDRZEJ, Engr., Experimental Laboratory "RADIOPAN," Institute of Molecular Physics, Polish Academy of Sciences

[Abstract] The power supply source described is designed for feeding electromagnetic coils in order to obtain highly stable magnetic fields for spectroscopic investigations and magnetic-field topography. It may be also used wherever high stability of power supply is required. Parameters of the stabilizer are: power output 2.5 kw; maximum current 50 A; load resistance 1Ω; stabilization inaccuracy 5×10^{-6}/1 hr - 1×10^{-5}/8 hrs; ambient temperature range 10-30°C. The high stability of the system is a result of judiciously organized connections, the use of integrated circuits, and its thermal stability. Diagrams 2; references 3: 2 Polish, 1 Western.

USSR UDC 621.311.42.018.14-213.34.001.4

LOAD FACTOR IN AN EXPLOSION-PROOF TRANSFORMER SUBSTATION WITH A 1140-V SECONDARY

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 1, Jan 77 pp 18-19

KOZLOVA, V. N., engineer, KRIZHANOVSKIY, I. V., engineer, and PLETNEV, A. I., candidate of technical sciences, All-Union Scientific-Research Institute of Explosive-Proof and Mining Electrical Apparatus

[Abstract] Extensive strip mining with conversion to highly mechanized operations imposes increasingly heavy loads on the electrical power apparatus. A power system including a mobile large transformer substation, rated at 630 kVA and 6.0/1.2 kV, has been pilot tested for operation in mines of the Donets Coal Basin. The main purpose of testing two units, one in the No. 10 "Kurakhovka" pit and one in the "Krasnolimanskaya" pit, was to determine their efficiency and thermal characteristics, on the basis of an actual duty cycle covering three shifts. A comparison of the results with theoretical calculations indicates that the load factor rather than the demand factor should serve as the design criterion, inasmuch as calculations based on the latter lead to an underutilization of available power. Figures 2; tables 2; references 3 (Russian).

USSR UDC 621.313.323

NEW DEVELOPMENT IN THE FIELD OF CONTACTLESS SYNCHRONOUS ELECTRIC MOTORS

Riga IZVESTIYA AKADEMII NAUK LATVIYSKIY SSR in Russian No 11 (352), 1976 pp 3-7 manuscript received 1 Apr 76

KUTSEVALOV, V. M., and KOVALYUK, L. A., Physico-Energy Institute, Academy of Sciences, Latvian SSR

[Abstract] In the 9th Five-Year Plan a number of scientific-research and experimental-design tasks concerned with contactless synchronous motors were conducted at the Physico-Energy Institute of the Academy of Sciences, Latvian SSR. The presence of a production base--the Experimental Electronic-Mechanical Plant of the Academy of Sciences, Latvian SSR--made it possible to finish these tasks up to the preparation of prototypes of motors, which were tested under real operational conditions. The present paper gives brief information on the results of this work. Figures 3; tables 2; references 7 (Russian).

USSR UDC 621.313.333-213.34

NEW EXPLOSIVE-PROOF INDUCTION MOTORS FOR OPERATION IN CLASS-IV HAZARDOUS ATMOSPHERES

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 1, Jan 77 pp 25-28

PESYUKOV, V. N., VAYSENGOL'TS, V. A., TELYAVSKIY, I. D., and GOLUBEV, R. G., All-Union Scientific-Research Institute of Explosive-Proof and Mining Electrical Apparatus

[Abstract] New explosive-proof motors have been developed for operation in extra hazardous atmosphere, in a temperate or tropic climate, for various continuous-duty applications in chemical, petroleum processing and other industries. The V-series consists of 20 models, each to replace one or two existing ones, rated from 2.2 kW at 750 rpm synchronous to 11 kW at 3000 rpm synchronous. Their construction features include explosive-proof fits and a special terminal box. The basic motor components such as wound stators, wound rotors, shafts, and fans are standardized to almost the 75% target level, which should save about 29,000 rubles annually in manufacturing costs. Prototypes have been tested for performance, temperature rise, and reliability according to GOvernment STandard 183-66. Installation and operation of these motors, according to V4T5-V standard practice in explosive environments should save the industry about 350,000 rubles annually. For reference, the performance characteristics such as starting torque and current as well as full-load efficiency and power factor of the new and corresponding present models are listed along with their basic overall and mounting dimensions. Figures 1; tables 1; references 2 (Russian).

USSR UDC 621.313.435.2

NEW TYPE OF SATURABLE CORE CHOKE COIL

Moscow ELEKTROTEKHNIKA in Russian No 12, 76 pp 50-51

LEPP, V. B., candidate of technical sciences, SIBGATULIN, KH. M., and CHERKASOV, YU. N., engineers

[Abstract] The present paper is a follow-up to a previous paper by the same authors [Elektrotekhnika, 1975, No 10]. The paper discusses the basic electrical circuit of a saturable-core choke coil with split operating coils. Graphs are presented of experimental external and regulating characteristics of such a saturable-coil choke coil. The divergence between theoretical and experimental characteristics is governed by losses in semiconductor devices and connections. Delay of the moment of turn-on of thyristors at points close to the region of the transition of the supply voltage through zero value is also a cause giving rise to divergence of the results. Figures 3; references 2 (Russian).

USSR UDC [621.314.632:62-5].001.24

SINGLE-CYCLE VOLTAGE TRANSFORMER AS A SHAPER OF TRIGGER PULSES

Moscow ELEKTROTEKHNIKA in Russian No 12, 76 pp 11-14

ROZOV, V. YU., engineer

[Abstract] An analysis is made, on the basis of which the output device of a system of phase control is developed and tested. The system consists of a modulator fulfilled on a base of integrated microcircuits, shaping a packet of pulses with the first pulse of greater (balancing) duration in each control channel; a two-stage single-cycle transistorized pulse amplifier and pulse units, fulfilled according to the circuit of a single-cycle voltage transformer with a supplementary winding and a diode. The magnetic circuit of the pulse transformer is a protected ferrite core with an exterior diameter of 36 mm. The carrier frequency is 40 kHz. The device assures control of a transformer with 40 thyristors in the arm of a bridge circuit. The parameters of the triggering pulses are: the rate of increase of the current through the control junction of the thyristor is 1--2 A/microsec; the duration of the valley between pulses of the packet at the level of maximum amplitude is 0.5--1 microsec; the maximum duration of a cutoff (restoration time) is 40 microsec; and the duration of a control pulse is 8 ms. In the process the size of the device and the number of its elements is substantially decreased in comparison with a two-cycle output device described in the literature.

USSR UDC [621.314.632:62-5].001.3

DISCRETE SYSTEM OF CONTROL OF RECTIFIER BASED ON INTEGRATED CIRCUITS

Moscow ELEKTROTEKHNIKA in Russian No 12, 76 pp 15-18

ZYUBIN, V. F., candidate of technical sciences, KLIMOV, G. YE., and KRAVCHENKO, V. V., engineers

[Abstract] The logical structure of the proposed method of construction of a discrete system of control of a rectifier, convenient to achieve with integrated circuits, consists of the representation of an output parameter--the angle of regulation determined by the quantum numbers, variable in the process of regulation, and a smooth change of the quantum value in accordance with a change of the controlling effect. During this a cyclical buildup in the counter of a specified number of clock pulses and a smooth change of their recurrence frequency takes place. The output pulse appears with the establishment in the counter of a specified number. The special feature of such a logic structure is the impossibility of matching the start of counting of the clock pulses by the counter and a point corresponding to the zero value of the angle of regulation because this would require a

deviation of the timing frequency equal to infinity. This circumstance leads to the fact that in the case of maximum requirements with respect to a range of the angle of regulation from 0 to 180° the system of control turns out to be multichannel with the number of channels equal to the phasal nature of the converter and the operation of the counter must begin from the moment preceeding the point of spontaneous turn-on of the rectifier. All the logic part of the control system can be divided into the following units: synchronizer, converter of voltage and frequency of pulse, phase-shifting device, shaper of intervals, and the output logic circuits. An analysis is made of the static and dynamic parameters of the discrete control system. It is shown that the proposed system has higher parameters with respect to the symmetry of the angles of regulation, the precision of shaping the angles of regulation, reliability and universality than known and widely-used analog system. Figures 5; references 2 (Russian).

USSR UDC 621.315.1.002.5.027.8.014.2.015.38

ON THE CHARACTERISTICS OF THE ELECTRIC WITHSTAND STRENGTH OF EXTRAHIGH VOLTAGE OVERHEAD LINE INSULATION AND A METHOD FOR TESTING IT

Moscow ELEKTRICHESTVO in Russian No 12, Dec 76 pp 13-20 manuscript received 9 Oct 75

ALEKSANDROV, G. N., dr of technical sciences, POLOVOY, I. F., candidate of technical sciences, and GERASIMOV, YU. A., engineer. Leningrad Polytechnical Institute imeni M. I. Kalinin

[Abstract] It is advisable to perform tests of the insulation of lines and substations of extrahigh voltage with pulses with a length of the front of 2000-4000 MKS. During tests with pulses having shorter fronts of 250-500 MKS, the test voltage must be reduced by 15 percent in comparison with a level established to fit the basic mass of the overvoltage. During development of a procedure for tests of interphase insulation, it is necessary to consider the voltage at the third phase. Supports at guys for extrahigh voltage overhead lines have an advantage over free-standing wide-base supports, as long as they assure the possibility of a significant decrease of the insulation spacings. For a decrease of the spacings at supports of an extrahigh voltage overhead line it is advisable to use supports of metal construction, with possibly smaller transverse dimensions. It is shown that divergence of experimental data concerning the electric withstand strength of overhead spacings at a support, obtained in the USSR and abroad, is primarily determined by the construction of the support. Figures 7; table 1; references 18: 11 Russian, 7 Western.

USSR [UDC 621.315.1 + 621.311.4.002.5] .027.8.014.2.015.38

THE SHAPE OF SWITCHING SURGES ACTING ON THE INSULATION OF EXTRAHIGH VOLTAGE EQUIPMENT AND LINES

Moscow ELEKTRICHESTVO in Russian No 12, Dec 76 pp 20-24 manuscript received 14 Apr 75

BELYAKOV, N. N., RASHKES, V. S., candidates of technical sciences, KHOYETSIAN, K. V., and SHLEYFMAN, M. B., engineers. All-Union Scientific-Research Institute of Electric Power Engineering

[Abstract] The dimensions of the insulation of extrahigh voltage electrotransmission are primarily determined by the permissible rate of system-generated overvoltage; however, it also depends on the shape of the switching surge which is assumed for calculating. Consequently, during norm setting of methods of testing of the insulation of electrical equipment of 750 kV and above, and the choice of insulation intervals for electrotransmission of these voltage classes, it is important to select the shape of the test switching surges in a sound manner. For this purpose, the paper considers the following: 1) Determination of the length of the front of the switching surge; 2) Calculated switchings for insulation lines and their repetition rate; 3) Switching surges originating during turn-ons of line; 4) Switching surges originating during three-phase disconnecting of nonsymmetric short circuits; 5) Connection of length of front with rate of overvoltage and probability of different lengths of front; 6) Calculated switchings for substation insulation and their repetition rates; and 7) Switching surges originating during turn-ons of a transformer and disconnections of a shunting reactor. It is shown that during choice of the insulation of lines, a switching surge with a length of the front of approximately 1000 MKS must be assumed for calculating; the insulation for a substation must be selected according to the minimum of a U-shaped characteristic curve. Figures 2; references 14: 7 Russian, 7 Western.

USSR UDC 621.316.542.064.25.027.3.001.45

TESTS OF LOW-OIL-CONTENT 10, 35 kV CIRCUIT BREAKERS WITH THE OBJECT OF DETERMINING THE PERMISSIBLE NUMBER OF DISCONNECTIONS

Moscow ELEKTRICHESKIYE STANTSII in Russian No 12, Dec 76 pp 53-56

POPOV, A. A., engineer, SHILIN, N. V., and SHLEYFMAN, I. L., candidates of technical sciences. Scientific-Research Center for Tests of High-Voltage Equipment

[Abstract] The results are presented of investigations of the change of the technical parameters of low-oil-content circuit breakers in the case of frequent disconnections of short-circuit currents. On a basis of the investigations conducted a method is developed for determining the permissible number of disconnections of short-circuit currents, without repairs, of low-capacity oil circuit breakers with a rated voltage of 10 and 35 kV. It is found that the methodology developed makes it possible to unify tests for the purpose of determining the permissible number of connections (PND), which are conducted at various test laboratories and by various enterprise--manufacturers. The PND with a complete retention of the technical parameters of the circuit breaker should be considered to be the principal index characterizing the switching safe life. PND with partial retention of the technical parameters may be additional indices of the switching safe life of the circuit breaker. The permissible number of disconnections for 10 and 35 kV low-oil-content circuit breakers is primarily determined by the electric strength of the internal insulation, and for circuit breakers at a voltage of 35 kV also the disconnecting capacity. Tests of the VMP-10 circuit breaker showed that for these circuit breakers the following values of PND can be guaranteed: with a 20 kA current--7, with a 12 kA current--20, and with a 6 kA current--not less than 48. The investigations conducted and the methodological situations can be taken as a basis during formulation of a method of determining PND with high-voltage circuit breakers of other types. Figures 5; references 9: 6 Russian, 3 Western.

USSR UDC 621.316.722.032.004.68

EXTENDING THE CURRENT RANGE OF THYRISTOR-TYPE VOLTAGE LIMITERS

Moscow PROMYSHLENNAYA ENERGETIKA in Russian No 1, Jan 77 pp 32-34

SOKOLOV, V. F., Kharkov Institute of Civil Engineers

[Abstract] Voltage limiters are recommended for the protection of electric lighting apparatus against voltage fluctuations (overvoltage) when electric power apparatus operates from the same line. The basic components of such limiters are a servo unit consisting of various thyristor switches and a control unit acting as a commutator. The current range of such limiters

can be extended by using symmetric thyristor elements and thus eliminating the need for special current equalizers: now the current in each thyristor depends only on the resistance of the series load and not on the resistances of other parallel branches. By connecting one symmetric thyristor to a group of lamps and then connecting all groups in parallel, it becomes possible to design a voltage limiter of almost any power rating. An experimental unit of this kind has been developed for a three-phase power and lighting system (220 V). The thyristors operate here with a firing angle of 80-85° and, because their load does not exceed 30 percent, require not more than conventional protective fuses. This limiter stabilizes the load voltage within 1.5% as the phase voltage rises up to 257 V and within 5.0 percent as the phase voltage rises up to 265 V. While thyristor stabilizer-limiters with a current rating of 63 A are now manufactured at a unit cost of 98 rubles, the new model with a rating of 56 A can be manufactured at a unit cost of 28 rubles. Its current (power) rating can easily be increased by enlarging the assembly of symmetric thyristors in each phase. Figures 2; references 5 (Russian).

USSR UDC 621.317.333.6

HEAT-RESISTANCE OF INSULATION SYSTEMS WITH ENAMELED WIRES

Moscow ELEKTROTEKHNIKA in Russian No 1, Jan 77 pp 51-55

BERNSHTEYN, L. M., and PESHKOV, I. B.

[Abstract] The results are presented of a determination of the heat-resistance of insulation systems based on enameled wires of classes of heat-resistance A, B, and F. It is concluded that once more the results of the tests point to the fact that the reliability of the windings of electrical machines and apparatus depends not only on the quality of the original wire but also on a whole series of other factors, in particular on the conditions of winding and the type of impregnation varnish used. An incorrect choice of the impregnating varnish, the covering enamel or excessive mechanical load during winding are able to reduce the heat-resistance of enameled wires and consequently also the lifetime of the windings made with these wires, for class 1-3. Figures 2; tables 6; references 2 (Russian).

EAST GERMANY

USE GUIDELINES AND CIRCUIT EXAMPLES FOR THE ST 103 THYRISTOR

East Berlin RADIO FERNSEHEN ELEKTRONIK in German Vol 25 No 22, Nov 76
pp 722-724

REGEL, WILFRIED, Television Electronic Works State Enterprise, East Berlin

[Abstract] The ST 103 is a low-power thyristor in a plastic housing. It has a long-term limit current of 3 A and a voltage range of 100 to 600 V. Guidelines are presented for the designing of circuits for the following cases: ignition with direct current, ignition with pulse, determination of the loss power, protection against excess voltage. Circuit examples are presented for rpm control in universal motors: using a diac in the thyristor circuit, reversing circuit for a universal motor, rpm control for a universal motor, and circuit for brightness adjustment of incandescent lamps. Figures 10; no references.

USSR

UDC 621.3.027.8

METHOD OF CALCULATING THE ELECTROSTATIC FIELD OF COAXIAL AXISYMMETRIC SCREENS

Minsk IZV.VUZ:ENERGETIKA in Russian No 10, 76 pp 31-37 manuscript received 15 Dec 75

YARMARKIN, M. K., engineer, Leningrad Order of Lenin Polytechnical Institute imeni M. I. Kalinin

[Abstract] The problem of limiting the corona discharge from elements of power lines and substations of higher classes of voltage requires the creation of various types of screens, among which it is possible to distinguish a wide class of axisymmetric construction. Analytical solutions are found in the literature for single and double circular toroids. However, the increase of rated voltages and the complication of construction of high-voltage equipment establish the necessity for the use of combination screens, consisting of several toroids (3 and more), as well as having a noncircular cross section. The analytical solutions mentioned are not suitable for calculation of the maximum field intensity at the surface of such screens. The present work proposes a method, which in principle does not have limitations with respect to the quantity and the form of cross section of the elements of the combination screens, which are a combination of the coaxial bodies of revolution with a uniform distribution of the field intensity in any direction. The method of calculating the electrostatic field of split screens is described, based on replacement of the surface of the toroids by a set of so-called elementary toroids of finite radius r_0. The charges on the toroids are determined by the solution of a system with potential coefficients, and subsequently the magnitude of the charge density of a given point of the surface is assumed to be the value of the charge of the corresponding elemental toroid, relative to the area of the section of the surface equivalent to it. In the particular case of an isolated toroid a formula is obtained for the intensity at the surface of the toroid in the form of the sum of a given series. The distribution of the field intensity obtained along the surface of the screens is compared with the results of calculations according to analytical formulas from the literature for an isolated circular toroid, with a ratio of the distance between elemental toroids to the radius $r_0\mu = 6.3$. The method described is applied to calculation of a triple toroidal screen with a determined optimum ratio between the radius of the tube and the distance between toroids, as well as permissible deviations from the magnitudes mentioned. The method is recommended for use in the practice of planning of the screen systems of the equipment of high classes of voltage. The method can also be used for calculations of more complex axisymmetric construction, in particular for screens split into five and more components. Figures 4; references 5: 4 Russian, 1 Western.

USSR

UDC 621.311.1

SIBERIAN POWER ENGINEERING IN THE 10th FIVE-YEAR PLAN

Minsk IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: ENERGETIKA in Russian No 11, Nov 76 pp 3-8 manuscript received 28 Jun 76

POPYRIN, L. S., corresponding member, Academy of Sciences USSR, SAVEL'YEV, V. A., and SLAVIN, G. B., engineers [Siberian Power Engineering Institute, Siberian Division, Academy of Sciences USSR]

[Abstract] In the light of the decisions of the 25th Congress of the Communist Party, Soviet Union, the paper discusses the principal trends of growth of the fuel-power economy and the united electrical power system of Siberia in the 10th Five-Year Plan. The problems of development of the fuel-power economy are determined firstly by the necessity for assuring by fuel and electrical power a characteristic national economy developing at a high rate, and secondly the solution of such state-wide problems as the discharge of the increasing deficit of energy resources in the European regions of the country and the export delivery of various kinds of fuel. A successful solution to these problems is possible only on a basis of complex long-range programs which provide for efficient use of investments, labor and material resources, coordination with the development of adjoining branches of the national economy, and utilization of new regions, especially those with high-grade raw materials and fuel. Development of such programs is the principal new trend of the present day stage of growth of USSR power. In Siberia, on the basis of long-range programs, three great power complexes will be developed--the West Siberia Oil and Gas, the Kansko-Achinskiy Fuel-Power, and the Angar-Yenisey Hydropower. The development of Siberian electric power and of central heating during the 10th Five-Year Plan are discussed, and certain problems in creating the Kansko-Achinskiy Fuel-Power Complex mentioned above are considered. There are a number of complex scientific-technical problems in the development of Siberian power engineering during the 10th Five-Year Plan. Their urgent solution is possible only the basis of concentrated and coordinated participation of the great scientific and engineering associations. An important role in this also belongs to the power departments of higher educational institutes. References 6 (Russian).

USSR UDC 621.311.1:621.316.761.2:621.319.4

ON LOCATING SHUNT CAPACITOR BANKS IN HIGH-VOLTAGE DISTRIBUTION NETWORKS OF POWER SYSTEMS

Moscow ELEKTRICHESTVO in Russian No 12, Dec 76 pp 5-8 manuscript received 7 May 76

PEKELIS, V. G., candidate of technical sciences, and ROZENBERG, A. YE., Minsk

[Abstract] The possibilities are shown of using a quadratic target function, with limitations only at nonnegativeness of variables, for optimization of locating unregulated (conditionally not switched off) capacitor banks in high-voltage distribution networks of power systems. A method is proposed for determining the effect created by the individual banks, with an arbitrary number of them in the network. The index of efficiency obtained can be used not only at the planning stage but also for determining the optimum priority for introducing capacitor banks into operation. Figures 2; references 6 Russian.

USSR UDC 621.315.05

DISTRIBUTION OF ELECTRICAL FIELD OF MULTIWIRE OVERHEAD LINE FOR ELECTROTRANSMISSION OF PULSATING VOLTAGE

Minsk IZV.VUZ:ENERGETIKA in Russian No 10, 76 pp 25-30 manuscript received 15 Oct 75

SIDOROV, V. S., candidate of technical sciences, dotsent; and SEMKO, YA. P., engineer: L'vov Order of Lenin Polytechnical Institute

[Abstract] As has been shown in the literature, continuous duty of persons at a 500 kV substation without means of protection leads to an impairment of the state of their central nervous and cardiovascular systems, a change of the composition of the blood, etc. The effect of the electrical field is intensified with an increase of the operating voltage, and the intensity of the functional disorders is found to be directly dependent on the duration of a stay in the field. All this leads to the necessity, during development, planning and operation of the electrotransmission of pulsating voltage to know and to take into account the distribution of the electrical field in the area of an overhead line and at the open distribution devices of substations. The present paper analyzes distribution of the electrical field of a four-wire overhead line for electrotransmission of pulsating voltage in the case of possible operating conditions. A program was developed for calculation on a M-222 electronic computer of the electrical field of an n-wire overhead line. Graphs are shown of the electrical field

of a four-wire overhead line during operation of a section of 220 kV a-c voltage and of $\pm$ 200 kV d-c voltage; and the electrical field of four-wire overhead line during simultaneous operation of sections for transmission of pulsed voltage. An evaluation is made of the operating conditions of operational personnel for an overhead line of pulsing and a-c voltage of the class in question. Figures 4; references 9 (Russian).

EAST GERMANY

GAMMA-RAY DOSE RATE AND NEUTRON FLUX DENSITY DETERMINATION IN THE COMPARTMENTS CLOSE TO THE REACTOR OF THE GREIFSWALD NUCLEAR POWER PLANT "BRUNO LEUSCHNER" DURING STARTUP OPERATIONS

East Berlin KERNENERGIE in German Vol 19 No 11, Nov 76 pp 336-344 manuscript received 31 Mar 76

GUEHNE, F., KUNZE, R., and GOEBEL, J., Power Plant Construction Combine State Enterprise, East Berlin; PROKERT, K., DOERSCHEL, B., and SCHURICHT, V., Physics Section, Technical University, Dresden

[Abstract] Measurements with thermoluminescence dosimeters, solid-state dye dosimeters (for gamma dose rate), activation probes, and solid-state trace detector (neutron flux density) were carried out, using integrating detectors in various areas (a total of 700 test points) of the power plant during various stages of the startup process. The reactor power was measured, and readings were taken in the ionization-chamber channels, behind a steam generator, and behind shielding walls. The detectors and test procedures were found suitable for measurements of this kind. The results, presented in diagrams, indicate that in the areas close to the reactor there is linear relationship between the gamma dose rate and the neutron-flux density as well as between the gamma dose rate and reactor power as determined by means of the heat balances. A soft neutron spectrum was found to exist at all test locations. Figures 9; references 15: 12 German, 3 Western.

CSO: 1860

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